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Electric Railway Journal

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Instructions for Use of Index

This index is essentially a subject index, not an index of titles, and articles treating a number of different subjects are indexed under each of them. In addition, a geographical reference is published wherever the article relates to any particular railway company, or to the State matters of any particular State. The geographical method of grouping serves to locate in the index any article descriptive of practices, conditions, events, etc., when the searcher knows the electric railway, city or State to which the article applies. Groupings are made under the name of the city in which the main office of the company is located, but an exception is made in the case of electrified sections of steam railroads, such entries being made direct under the name of the railroad. City or State affairs appear direct under the names of the city or State involved.

In the subject index, the alphabetical method is followed, and if there is a choice of two or three keywords the one most generally used has been selected, cross references being supplied. Below will be found a list of the common keywords

used in the index. This list has been subdivided for convenience into sixteen general subjects, but the general subject headings, shown in capital letters, do not appear in the body of the index. As an example, if a reader wished to locate an article on power-driven tower wagons he would obviously look in the list under the general subject "vehicles," and of the two keywords that appear under this caption, only "Service and tower wagons" could apply to the article in question. The reader would therefore refer to this keyword under "S" in the body of the index.

In addition to the groups of articles covered by these headings the papers and reports from railway associations and technical societies are grouped under the names of the various organizations. Proceedings of other associations are indexed only in accordance with the subject discussed. Short descriptions of machine tools appear only under the heading "Repair Shop Equipment" and are not indexed alphabetically, because of the wide choice in most cases of the proper keyword.

CLASSIFIED LIST OF KEYWORDS

ACCIDENTS AND LEGAL

Accidents (including wrecks)
Accident claim department
Legislation
Legal
Public service and regulative commissions
Public service corporations
Safety-first movement

CARS

Car design
Cars (descriptive)
Cleaning and washing of cars
Gasoline cars
Lubrication
Heating of cars
Lighting of cars
Storage battery cars
Ventilation of cars
Work and wrecking cars

CAR EQUIPMENT

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Bearings
Brakes
Controllers and wiring
Couplers and bumpers
Current-collecting devices
Doors and steps
Fenders and wheel guards
Gears and pinions
Headlights
Motors
Seats and windows
Trucks, car
Wheels

EMPLOYEES

Employees
Insurance
Strikes and arbitrations
Wages

FARES

Fare collection (including apparatus)
Fares
Freight rates
Tickets
Transfers

FINANCIAL AND STATISTICS

Accounting
Appraisal of railway property
Financial
Franchises
Maps
Operating records and costs
Statistics
Traffic investigations

HEAVY ELECTRIC TRACTION

Heavy electric traction (general)
High-voltage d.c. railways
Interurban railways (general)
Locomotives
Low-voltage d.c. railways
Single-phase railways

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Inspection of cars

Maintenance records and costs

Paints and painting
Repair shop equipment
Repair shop practice
Repair shops
Tests of equipment
Welding, special methods

OPERATION

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Operating records and costs
Passenger handling records
Schedules and time tables
Signals
Stopping of cars
Train operating practice

POWER

Boilers and equipment
Cables
Energy consumption
Feeders
Overhead contact system
Poles
Power distribution
Power generation
Power stations and equipment
Purchased power
Substations and equipment
Third-rail contact system
Transmission lines
Turbo-generators and equipment

RECORDS

Maintenance records and costs
Operating records and costs
Passenger handling records
Record forms

STRUCTURES

Bridges
Carhouses and storage yards
Power stations and equipment
Repair shops
Terminal stations and terminals
Waiting stations

TRACK

Pavement
Rail joints and bonds
Rails
Special work
Ties
Track construction
Track maintenance

TRAFFIC

Freight and express
Public Relations with
Publicity
Routing of cars
Traffic investigations
Traffic stimulation

VEHICLES (not on tracks)

Motor buses
Service and tower wagons

MISCELLANEOUS

Fire protection and insurance
Lightning protection
Loading limits for cars
Manufacturing conditions
Municipal ownership
Public Relations with
Standardization
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Timber preservation

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*Illustrated

The Electric Railway Industry

A Review and a Prophecy

AS a traveler climbing a mountain will often not realize the height he has attained until, pausing, he looks back over the route he has traversed, so in any industry, if one would obtain a comprehensive view of the industry, he must pause occasionally and survey the field.

The beginning of a new calendar year has long been accepted as a logical period for surveys of this kind and now is, therefore, an appropriate time for those engaged in the electric railway industry to pause and consider.

with all the activities of our country, have been profoundly affected by the material and the sociological developments of the times and the effects of the great world war.

The spirit and effort with which this crisis is being met is a real testimonial to the character and ability of the personnel of the electric railways. Ordinarily it is a slow and laborious process for any large and complicated industry to change its fundamental habits. In endeavoring to meet the economic pressure of recent years, however, the electric railways have not merely changed their habits—they have revolutionized them, and they have done this with a rapidity that is truly astonishing.

Looking back over the past few years two developments in transportation stand out which affected the electric railways profoundly and created new ideas regarding transportation of passengers.

The first was the automobile. The development of this machine established a rival for the electric railways, and this rival was in the unique position of competing with the railways as to quality of service without being obliged to compete in price. Naturally it soon took from the railways a large part of those customers to whom price was no object. Adding insult to injury, however, the "jitney" then appeared, adding new standards of speed and convenience for short-haul passengers. There was a distinct element



BIRNEY ONE-MAN CAR



DOUBLE-TRUCK, ONE-MAN CAR



SINGLE-TRUCK, ONE-MAN CAR



(Continued on next page)

of injustice in this competition, in that equality of taxation and responsibility was lost sight of.

The second was the establishment, in the majority of States, of public utility commissions. In the midst of the adjustments due to the automobile and the jitney these public control bodies took the electric railways out of the class of private business, whose first duty is to secure financial returns, and made them subject to trial, condemnation and regulation. The result of these new competitors—auto and jitney—and this new commission control was to affect seriously both the income and the expense accounts of the railways.



ONE-MAN CARS IN WACO, TEXAS

The first idea that occurs to one when his income suffers is that he should reduce his expenses correspondingly and postpone expenditures for improvements. The railways reacted in the common way. Fortunately for the industry, perhaps, rapidly rising prices of labor and material soon made it evident that no adequate solution could be expected on this basis.

A new spirit is now in evidence among the electric railways. Pressing needs for higher revenues have awakened them to the fact that they are commercial enterprises—that their function is not merely to **run cars** but to **sell service**, and that, like any other manufacturing company, the amount of their product which they can sell depends very largely on how well its quality suits the public and how attractively it is offered. This is an entirely new attitude of mind and a new basis of doing business, and makes clear the course of action for the future.



SOUTHERN PUBLIC UTILITIES
SINGLE-TRUCK, ONE-MAN CAR



A CLEVELAND CENTER-ENTRANCE CAR

In carrying out the plans, however, an unexpected obstacle arose—in the attitude of the regulating bodies. While it is a familiar saying that you “cannot make bricks without straw” it has not been as clearly recognized that you cannot run railways without money.

The Public Service Commissions have in many instances ordered increased service without giving due consideration to the financial problem involved. The service ordered could only be provided by depriving the stockholders of their fair and just return on their investment. While the commissions are now very generally endeavoring to be fair in their control the railways have arrived at a condition



where the great majority of the electric railways in this country must increase their revenue immediately or go into the hands of receivers.

They cannot give the service the people demand and ought to have unless help is given by the people in the form of increased revenue, reduction in taxes and other financial burdens.

Senator Underwood and other public men have told the electric railway men repeatedly that they should not blame legislators, Public Service Commissions or City Council men when they passed unjust laws or issued unfair orders, placing additional restrictions and burdens on the electric railways, because these representatives of the people were merely responding to the will of the people they represented. If the will or demands of the people were unfair or were based on erroneous assumptions, the burden of educating the people rested with the Public Utility Company and not the legislators. This responsibility the electric railways are assuming.



A SANTA BARBARA, CALIF., CENTER-ENTRANCE CAR



TRAIN SERVICE IN SCRANTON, PA.

They, too, realize that to ask for fair play for the street railway is unpopular. Fair play is always popular with the public when the public sees that it is fair play. There is a growing knowledge on the part of the public of the street railway business and a growing realization that co-operation and mutual help on the part of the public and its representatives with the railways is necessary.

The splendid work of many leading railway men during the last six months is beginning to bear fruit. A number of electric railways have been granted increased fares; quite a few daily papers and magazines have published articles

setting forth the true facts regarding the street railway company serving their community. The year 1918 has great promise for the better.

The manufacturers who supply cars and equipments are naturally



QUICK SERVICE IN DAYTON, OHIO



(Continued on next page)

very familiar with the condition of the electric railway business. Their business makes it necessary for them to keep in touch with all phases of the industry, such as physical requirements, finances, credits, etc., etc. Their sales force is mingling with the people in all communities, consequently they are in touch with the "car rider's" viewpoint also and are responding to the call of the Amer-



HEAVY TRAFFIC IN WASHINGTON, D. C.

ican Electric Railway Association in doing their bit toward correcting the numerous wrong impressions that exist regarding the street railways. As a business or industry the electric railway is unique—it is fundamentally in a class by itself. Its function is to transport the people to and from business each day reliably, comfortably, speedily and courteously. This service must be performed all of the time under the critical eye of the public.

The people demand this kind of service as their right and everybody agrees they are entitled to it. But all reasonable men also agree that since the people demand this as a right they should be equally insistent that their representatives be fair and just and eliminate those things which prevent the railways furnishing the right service.

The street railway is serving the great majority of the citizens of any community, therefore the street cars should have the right of way on its tracks. Frequently several thousand people are delayed by individual automobiles or other vehicles. The railway company cannot afford to take the slightest risk of accident because they know from experience that the average jury will allow exorbitant claims.



MOTOR CAR AND TRAILER,
PITTSBURGH, PA.

With the ever-increasing burden imposed each year upon them, the railway managers have been kept on the griddle, endeavoring to comply with often unjust demands, and at the same time meet the continuing demands of the people for increased service and the employees for increased wages, and do it all with the same five-cent fare. Up to the war period they were doing heroic work notwithstanding these conditions. The records of the past five years show the progressive steps various railway men have taken, hoping to improve the situation by the introduction of more economical methods of operation and



SINGLE-TRUCK, ONE-MAN CAR

more economical types of cars and equipment. When the great war came, and with it the great advance of raw materials and supplies of all kinds, as well as labor, then, and not until then, did they throw up their hands and say to the people—"It cannot be done on a five-cent



fare." This led to the placing of their financial conditions before many Public Service Commissions, accompanied by a request for increased fares.

A review of what the railway men have been doing will show that scarcely anything has been overlooked that would effect economy, safety and reliability. Many properties have adopted such measures as offered the best solution for their particular requirements. For example, one railway speeded up its schedules and gave better service by using the skip stop. Another improved on this by inventing the stagger stop. A third started traffic surveys and graded its service to the needs of its patrons by "short-line" cars. A fourth reduced congestion and solved the man problem by coupling its cars in trains. A fifth built up its traffic by reducing the headway and met the expense by one-man



LIGHT-WEIGHT CARS IN BOSTON



INTERURBAN TRAINS IN WILMINGTON, N. C.

operation. A sixth, on the other hand, secured similar results with increased headways, by publishing definite time tables and working rigidly to them. A seventh line reduced costs and increased reliability by replacing its obsolete motors, with light weight modern ones. An eighth secured partial results of some sort by taking better care of the equipment it already had. A ninth raised capital for needed improvements by selling securities to its patrons. A tenth—an interurban—established through-freight service

over a connecting line. An eleventh petitioned for increased fares and presented its case, not with a whine, but in so convincing and business-like a manner that the community joined in urging that the increase be granted.

Other dozens of companies did numerous other things, but it is not so much the plans adopted that concern us as the spirit which prompted them—the commercial spirit, the spirit of progress. This is the spirit which is recognizing the kinship of the entire industry. The manufacturers have responded in almost every instance to the call of the electric railway operators and have expended large sums cheerfully in developing any new apparatus which



TRAIN SERVICE IN LOUISVILLE, KY.

gave promise of reducing operating costs, even though the probabilities of reasonable returns were sometimes quite remote. Examples of these are the light-weight motor for 24" wheels; the "HLD" control



(Continued on next page)

for train operation on low-floor surface cars; the light weight circuit breaker; the light weight trolley; re-designing the entire line of railway motors two or three times during the past five years, each change making reductions in weight and increasing the operating efficiency.



CENTER-ENTRANCE CARS IN
CLEVELAND, O.

The railways, the public, the public legislative, executive and regulating bodies, the manufacturers are one and all evidencing a growing spirit of kinship—a spirit which is recognizing that they are mutually responsible for service which we must have in the transportation of passengers on our streets.

What of the Future?

While the condition of the street railway as a business, profitable to its stockholders and satisfactory to its patrons, is perhaps at the lowest point it has ever reached, profiting by the view backward, as outlined above, we are justified in saying that the future of the electric railway industry is bright. Any human endeavor is progressive and successful only through the spirit which permeates it and guides its activities. The new spirit which is prevalent throughout the industry among the street railways, the manufacturers and the public, is a guarantee that from now on the railways will perform a more valuable and adequate service; the manufacturers will undertake the necessary development of improved apparatus and the public



A BUSY SPOT IN ATLANTA, GA.

will demand and give the railways the necessary capital to justify the improved condition. We are justified in predicting:

"That the electric railway business, which is perhaps one of the most fundamental businesses of the country, will again come into its own and be a business of good repute and mutual profit to the public, the railways and the manufacturers."



TRAIN SERVICE IN WILKES BARRE, PA.

Westinghouse Electric & Manufacturing Co.
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Houston, Tex.
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Mexico City
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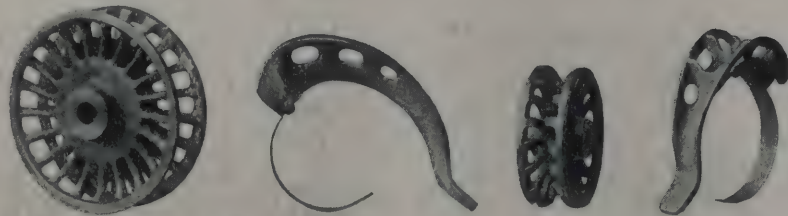
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Maintain your *Quick-Service* Schedule

with

Nuttall Sleet Wheels and Scrapers



The *Quick-Service* Car produced for giving quick dependable service to the public and profit to its operators will fail if the principal element of its operation is diminished—*Quick-Service*.

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When trolley wires are covered with ice and snow it will be the car equipped with the Nuttall Sleet Wheel or Scraper that will maintain its schedule—being assured a good, clean trolley contact.

Nuttall Sleet Wheels and Scrapers are made of the best phosphor bronze—two sizes, 4 and 6 inches; rugged contact surfaces effecting clean wires.

Prepare for sleet storms—order today

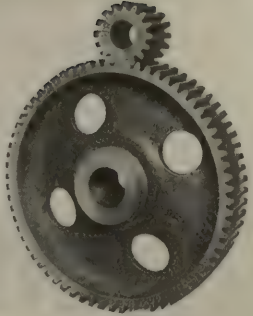
NUTTALL
PITTSBURGH



Quick-Service Gears and Trolleys

for
Economical Operation

"It is the little things that count"



Electric Railways all over the country are adopting the **Quick-Service** Car to reduce operating expenses. Though a great saving can be secured with this type of car, still maximum economy can only be attained through the use of equipment parts that give the greatest ultimate service.

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- 2 Narrow Face and Reduction of Section eliminates unnecessary weight.
- 3 Life four times untreated cast steel
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Let Us Know Your Requirements

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PITTSBURGH

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The case is of cast iron, specially sealed and treated before it leaves our foundry to prevent corrosion.

The sloping cover insures protection of bond and terminals from dragging equipment.

The terminal connections are advantageously located, insuring minimum length of leads.

The coils are of strap copper, spirally wound, arranged so as to provide protection against surges and impressed voltages of high frequency.

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The laminations are assembled under great pressure, and are held securely in place.

Provision is made for terminals of the clamp or bolt type. This allows bond to be disconnected without opening the cable connections at the rails.

"Union" Impedance Bonds have been standardized in ranges of capacities to meet all requirements of either d-c. or a-c. propulsion electric lines.

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Canadian Express Bldg.
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Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina



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O-B Trolley Catcher for

Dependable Service with Indifferent Care

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The three features go together naturally. Simplicity made unnecessary the use of small, delicate parts, consequently the mechanism is rugged. And this refinement of design of course brought efficiency in operation.

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Write for detailed description.

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Mansfield, Ohio



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The Ohio Brass Co., Mansfield, Ohio
General Sales Agents in U. S. for Crouse-Hinds Imperial Headlights

Uniformity Cuts Labor

What Is the Value of Tie Uniformity to You?

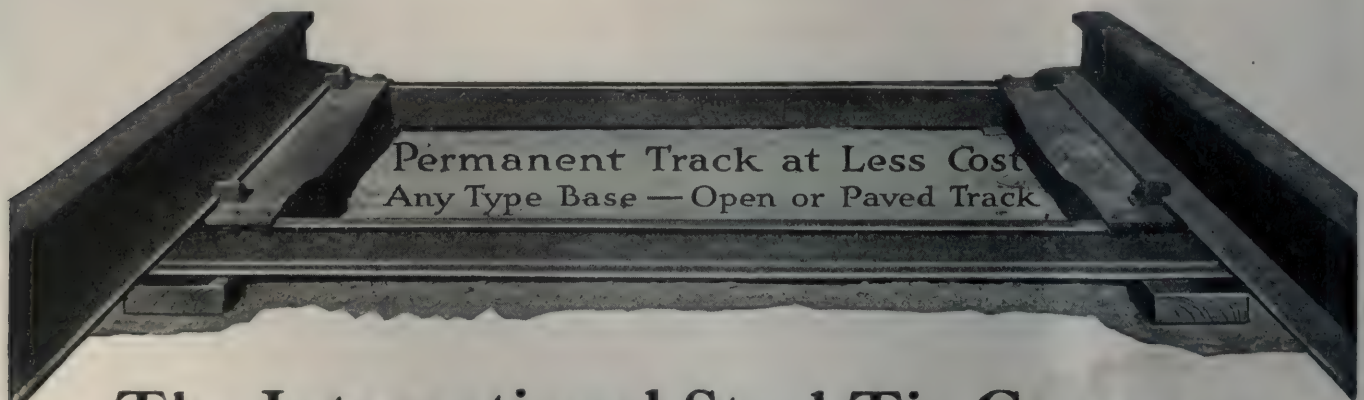
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What wooden tie will come within this specification? And your track gauge is fixed within the tie tolerance limit. Your track men have absolutely nothing to do with determining the gauge or the nicety of the fit of the rail fastenings. These are all provided for by thoroughly checked gauges in fabricating the ties. Every tie is like every other one, and every rail fastening is the same.

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For Eight Years

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Have saved coal — bettered operation

Hon. W. G. McAdoo, Secretary of the Treasury and Director-General of the steam railroads of the United States, as president in the year 1911 of the Hudson & Manhattan Railroad (McAdoo Tubes), was the first electric railway operator to place a large order with this company for the Rico Coasting Recorder. His decision has since been

Confirmed by

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A. L. Drum & Company	Stone & Webster.
Kansas City Board of Control.	

Prominent Operators

W. R. Alberger, Vice President and General Manager, San Francisco-Oakland Terminal Railways, operating 256 miles, 360 Recorders.

John A. Beeler, when Manager Denver Tramway Company, 229 miles, 220 Recorders.

M. C. Brush, President Boston Elevated Railway, 526 miles, 538 Recorders.

C. B. Buchanan, General Manager Virginia Railway & Power Company, 262 miles, 211 Recorders.

Britton I. Budd, Member Electric Railway War Board, President Chicago Elevated Railways, 186 miles, 395 Recorders.

J. J. Dempsey, Vice President Brooklyn Rapid Transit System, 779 miles, 500 Recorders.

General George H. Harries, Vice President H. M. Byllesby & Company.

Frank Hedley, Vice President Interborough Rapid Transit Company and New York Railways, 542 miles, 2700 Recorders.

Samuel Insull, Trustee Chicago Elevated Railways, 186 miles, 395 Recorders.

Col. Philip Kealy, President Kansas City Railways, 301 miles, 670 Recorders.

Horace Lowry, President Twin City Rapid Transit Company, 445 miles, 1100 Recorders.

Edward A. Maher, Jr., Vice President and General Manager Third Avenue Railway System, New York, 280 miles, 1125 Recorders.

Pennsylvania Railroad (Long Island and West Jersey & Seashore Electrifications), 372 miles, 89 Recorders.

Theodore P. Shonts, President Interborough Rapid Transit Company and New York Railways, 542 miles, 2700 Recorders.

Paul Shoup, President Pacific Electric Railway, 1060 miles, 600 Recorders.

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Stone & Webster (Seven properties).

United Gas & Engineering Corporation, Knoxville and Elmira.

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Time is the Essence of Railroading



1910

L. B. Stillwell reported in April, 1910, to the Interborough Rapid Transit Company that it was most desirable to measure the **Coasting;**

That the accelerating difference in motormen was found to be equivalent to 40.5% coasting, or 36% saving in power;

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Time is the Essence of Railroading

1912

John A. Beeler, Consulting Engineer, as vice-president and general manager Denver Tramway Company, in 1912, was the next big operator to see the value of the Rico Coasting Recorder.

Within one year after installation, the coasting had been raised to 29.6% and the consumption of energy cut down 17.2%.

This was equivalent to a saving of about **\$60 a day in the coal bill alone!**

In 1915 Mr. Beeler reported that the energy saving had gone up to 25%, the coasting raised to 38%, front-end accidents decreased 41% and armature life increased over 50%!

Denver has been using the Rico Coasting Recorder with splendid results for some six years.



1913



Sir Albert H. Stanley, when managing director London Electric Railway, authorized the installation of Rico Coasting Recorders.

The first tests on the Hampstead Tube, made during 1913, raised the general average of coasting to 37.1%, and the maximum to 47.4%.

The average increase in coasting was 14.6% and the reduction in energy requirements, 18.4%.

Sir Albert, therefore, was an **efficient fuel administrator** before Great Britain needed so much more coal for the needs of herself and her Allies.

The entire tube system of London has been served by Rico Coasting Recorders for nearly five years with the same success as on American railways.



Time is the Essence of Railroading



1914

W. R. Alberger, vice-president and general manager, San Francisco-Oakland Terminal Railways, was responsible for that company's adoption of the Rico Coasting Recorder.

In the preliminary tests on this system, the lowest man's coasting had been raised from 2.9 to 33.5%; the highest man's coasting from 16.6 to 53.6%; the average coasting from 8 to 43.8%!

Between June 30, 1914, and June 30, 1916, this company **saved \$118,681 in power cost** alone; and the savings now exceed **\$125,000 a year**.

At present prices for power, the savings for 1917 will be greater still.



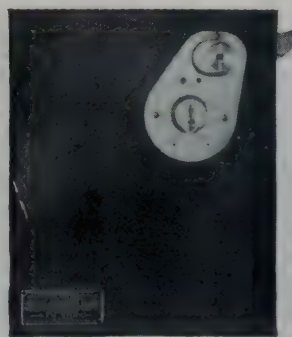
1915

United Gas & Electric Corporation installed Rico Coasting Recorders on its Knoxville lines in 1915.

Among the advantages of Rico Coasting Recorders noted by the management in addition to the 18.5% decrease in energy were the following:

Fewer flat wheels; decreased accidents; immediate knowledge of defective armatures and motormen's valves; automatic daily report of efficient and inefficient motormen; elimination of unnecessary layovers at terminals; and

Use of fewer cars (as three for four on one line) without decrease in mileage.



Time is the Essence of Railroading

1916

Paul Shoup, president Pacific Electric System, authorized, in 1913, trial of the Rico Coasting Recorder on the heavily traveled Pasadena Lines.

These tests showed that with the use of the Recorder alone, the motormen could save 11.2% in energy.

In 1916 the entire Pacific Electric System was equipped—600 Recorders in all—for all classes of service.

And the results under the able management of this great railway are constantly improving, both in saving of fuel and in speeding up of schedules.



1917

Horace Lowry, President, Twin City Rapid Transit Company, operating in St. Paul and Minneapolis, after exhaustive investigation, authorized the installation of 1100 Rico Coasting Recorders.

The decision of this well-managed, conservative railway, and of its consulting engineers, **A. L.**

Drum & Company, was another significant endorsement of the Rico Coasting Recorder as the best possible device for

Saving power, decreasing car maintenance, improving operation and obtaining the most economical schedule speed.



Time is the Essence of Railroading

These electric railways are answering for Coal Economy in the Rico Coasting



232 Rico Coasting Recorders
Showed the Slack in the Line at Vancouver, B.C.

Rico Coasting Recorders
are on Every Car Speeding over the Houston-Galveston Causeway

Stone & Webster Equip
Cape Breton Electric Co. Ltd. with Rico Coasting Recorders

200 Rico Coasting Recorders
Cut Brake Shoes 48% on Hudson & Manhattan

650 Rico Coasting Recorders
ordered by The Kansas City Railways Company

Pacific Electric Railway's
600 Rico Coasting Recorders

1102 Rico Coasting Recorders
on the Third Avenue Railroad, N.Y.

Manhoning & Shenango
RICO Recorder Road

Havana's Fastest Cars Carry
Rico Coasting Recorders

No Roads Are To
Rico Coasting Recorder

Short Line has
Rico Coasting Recorder

The Pennsylvania Railroad uses
Rico Coasting Recorders on its Long Island and New Jersey Suburban Service

211 Rico Coasting Recorders
are at Work in Old Virginny

Stone & Webster Equip
Houghton County Traction Company
Houghton, Mich. with Rico Coasting Recorders

1842 New York
Railways Cars to Carry Rico Coasting Recorders

The True Principle for Measuring Operating Efficiency

Time is the Essence of Railroad

Cold Cars and Reduced Service are not well received
Simplest and Quickest Way to secure Real Economy

Time is the Essence of Railroad

Fuel Administrator Garfield's Appeal ation's Crisis by the use of Recorders





Rico Coasting Recorders are on Every Car in Norfolk, Virginia



The Knoxville Lines of the United Gas & Electric Corporation use Rico Coasting Recorders through



600 Additional Rico Coasting Recorders
New York Municipal Railway Corporation (Brooklyn Rapid Transit) has just made application to the New York Public Service Commission for authorization



220 Rico Coasting Recorders Increased Amature Life 50 per cent at Denver, Colorado



153 Rico Coasting Recorders ordered by Stone & Webster for Houston



Twin City Rapid Transit (Minneapolis-St. Paul)



360 Rico Coasting Recorders Paid \$183.71 each per annum at Oakland



Complete Equipment of Rico Coasting Recorders for the World's Biggest Elevated Railway System, Chicago



183 Rico Coasting Recorders ordered by the Northern Texas Traction Company



The Salt Lake & Utah Valley Completely Equipped with Rico Coasting



Another Stone & Webster Property adopts Rico Coasting Recorders



538 Rico Coasting Recorders in the Service of the Boston Elevated Railway



4400 Rico Coasting Recorders Used in New York Alone



300 Rico Coasting Recorders Are at Work Under London, England



The True Principle for Measuring Operating Efficiency
Time is the Essence of Railroading



The True Principle for Measuring Operating Efficiency
Time is the Essence of Railroading

the Public. The Rico Coasting Recorder offers the
without diminishing the Revenue from Riding.

Time is the Essence of Railroading



1918

finds the Rico Coasting Recorder the standard fuel and power saver for electric railway car operation commercially accepted and adopted by leading railways everywhere and recommended by prominent engineers and Public Service Commissions. Acknowledging this fact, the railway manager will ask:

How am I going to get the money?

You can pay for the Rico Coasting Recorder just as you pay for your coal—out of your operating revenue. The Rico Coasting Recorder will pay for itself **in coal savings alone** within a year on almost any electric railway. When you charge its purchase to capital account, you will be increasing the **permanent** value of your property; and after the end of the first year the Recorder will be clear gain to you every succeeding year in continuing to save you thousands of tons of coal and improving your operation.



Time is the Essence of Railroading

Railway Improvement Company
61 Broadway, New York

To make money, save time, reduce stops and promote safety—Use these Keystone Specialties



Faraday Car Signal Systems

Operates from line voltage—no batteries. Faraday Push Buttons, Buzzers and Resistances furnish an Ideal, failure-proof car signal system.



Illuminated Car Signs

With these signs destination names can easily be changed and cars rerouted. Well labeled cars make more money. They eliminate the unnecessary stop caused by the intending rider being unable to decipher the destination name within braking distance. They eliminate unnecessary car stops.



Keystone Rotary Gongs

A louder gong and more continuous to meet requirements resulting from modern, heavy, noisy traffic in cities. Cuts down accident claims.



Safety Car Lighting Fixtures

To light up your cars scientifically, efficiently and safely. To save you money. A rapid creator of good public relations.



Keystone Motorman's Seats

For the motorman or conductor. A real collapsible, safe and durable seat. They make operators more contented.



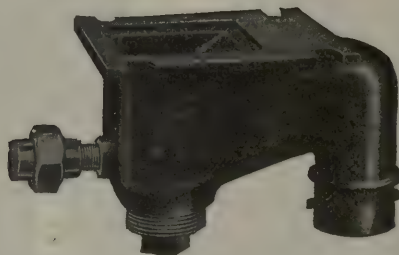
"Golden Glow" Headlights

To light up a path of safety for your cars. Only their famous reflectors can project the distinctive "Golden Glow" light.



Keystone Trolley Catchers

To protect your overhead construction from "flying" poles, thus preventing delays and tie-ups.



Keystone Air Sanders and Valves

To automatically sand your tracks by compressed air. A real device for safety and accident prevention.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



“ELRECO” STRAIGHTNESS

There is far more than meets the eye in the absolute straightness of the “Elreco” tubular poles.

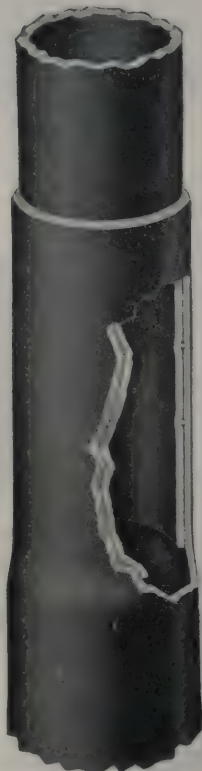
It is because they are tubular and perfectly cylindrical that “Elreco” poles are always straight and true in the ground.

Their circular shape takes all overhead strains, for “Elreco” tubular poles are designed in the only shape that combines the highest limit of efficiency with minimum weight.

For Sheer Strength and Sheer Elegance

“Elreco” poles must be your choice next time you are in the market for poles.

Get catalog No. 16 which tells all about “Elreco” poles and also about “The Wire Lock” and “The Chamfered Joint,” two features which mark “Elreco” pole-work as the standard of pole engineering.



Observe the
WIRE LOCK

ELECTRIC RAILWAY EQUIPMENT CO.

CINCINNATI, OHIO

New York: 30 Church Street

An interesting Two-Track Service over a one track trestle with "U. S." Electric Type G-1 Signals

To eliminate a grade crossing, the City of Portland, Oregon, is raising the level of Sandy Boulevard, while the Oregon-Washington Railway and Navigation Company is lowering its right-of-way.

In the meantime, the double track line of the Portland Railroad, Light & Power Company has been shifted to a temporary trestle.

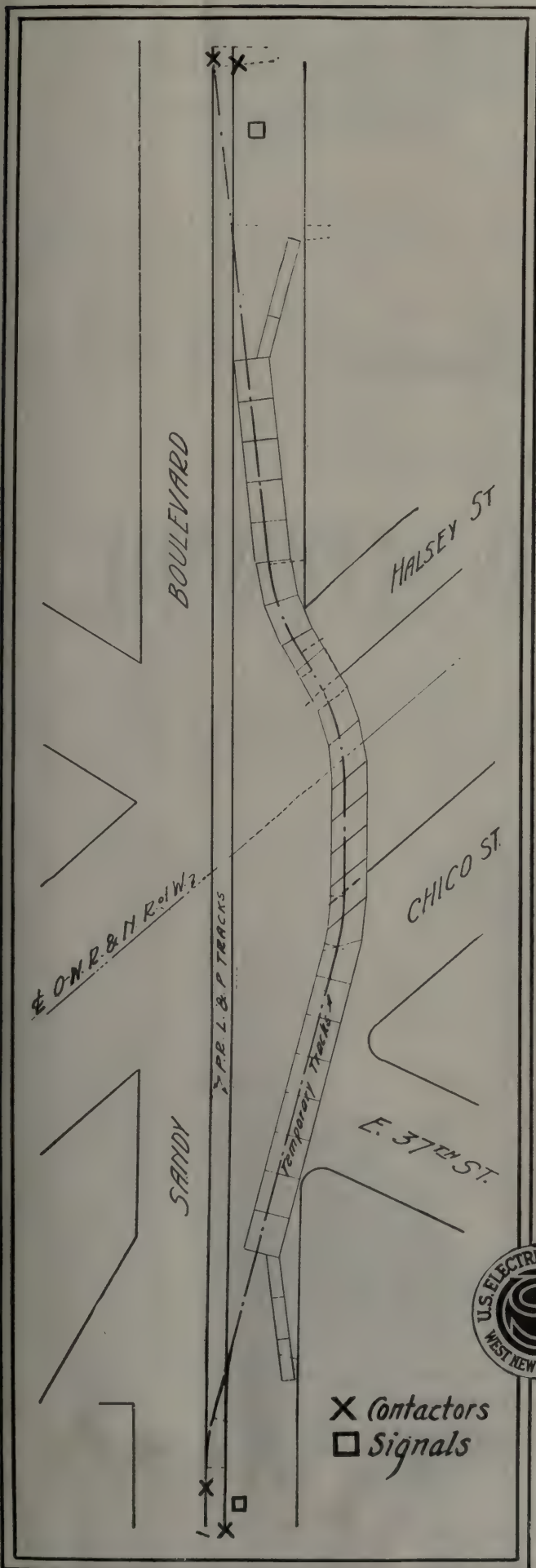
This trestle is so narrow that the tracks and trolley wires are gauntleted 7 in. centers, giving in effect a single track.

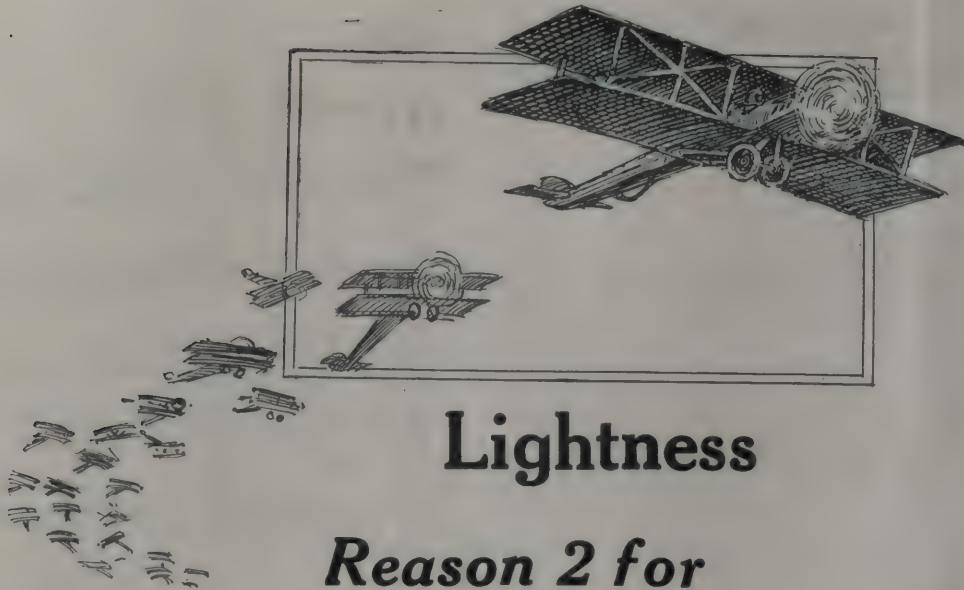
Note how readily safe operation over this temporary structure was secured by using four contractors and two U. S. Electric Signals.

Follow Portland's example of keeping several sets of U. S. Electric Signals on hand for special service.

It insures the safety of all of your passengers all of the time.

**United States Electric
Signal Company
West Newton, Mass.**





Lightness

Reason 2 for

"COPPERWELD" TROLLEY WIRE

"Copperweld" trolley wire weighs 7 to 10 per cent less than copper of equivalent section, so that fewer poles, span wires, hangers, insulators and other fixtures are required.

In these days of extraordinarily high prices, it is worth knowing that the lower cost of "Copperweld" trolley wire itself when compared with copper wire is made still more conspicuous by the savings in the equipment required to carry this trolley wire.

With 40-ft. chestnut poles at \$10 each, cedar poles at \$13 and tubular poles still higher in price, a saving of 10 per cent in the number of poles would in itself be a worthwhile economy.

Fewer poles, span wires, hangers, insulators and other parts also mean a saving in labor and maintenance as well as in first cost.

General Sales Office
Page Steel and Wire Co.
30 Church St., New York

Western Sales Office
Steel Sales Corporation
Chicago, Illinois

Made from the product of the Copper Clad Steel Co., Pittsburgh, Pa.
Drawn and sold exclusively by

PAGE STEEL AND WIRE COMPANY

MONESSEN, PA.

ESTABLISHED 1883

Your Spring Drive

on Bonding Troubles

Must Be Made with FEWER Men

Uncle Sam's needs are first these days:

His call for men who know how to handle railway equipment is especially insistent.

That means you are going to be short-handed—that four men will have to do the work of eight, two the work of four, one the work of two.

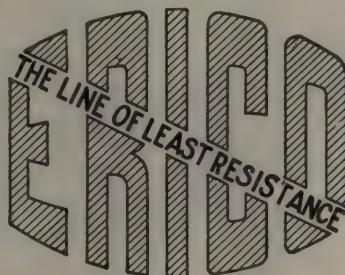
The Erico Portable Welder

Will enable you to meet this shortage. Its equipment is so easily handled and its application of the Erico Welded Bond so simple, that in emergencies one man could do the work.

The Erico Portable Welder, exclusive of the resistor, consists simply of a furnace box faced by a graphite plate which is pressed against the bond terminal by means of a suitable mounting. The carbon electrode which enters the rear of this box during the

operation draws an arc on this graphite plate. The furnace box and electrode is surrounded by a magnet which focuses the arc on to the graphite plate, producing the desired spread of the heat necessary for the welding of the terminal. This arc is so enclosed that it is not visible to the eye nor does it strike the bond or rail.

The positive control of the heat of the arc made possible by this construction assures an absolutely uniform homogeneous welding of the bond terminal.

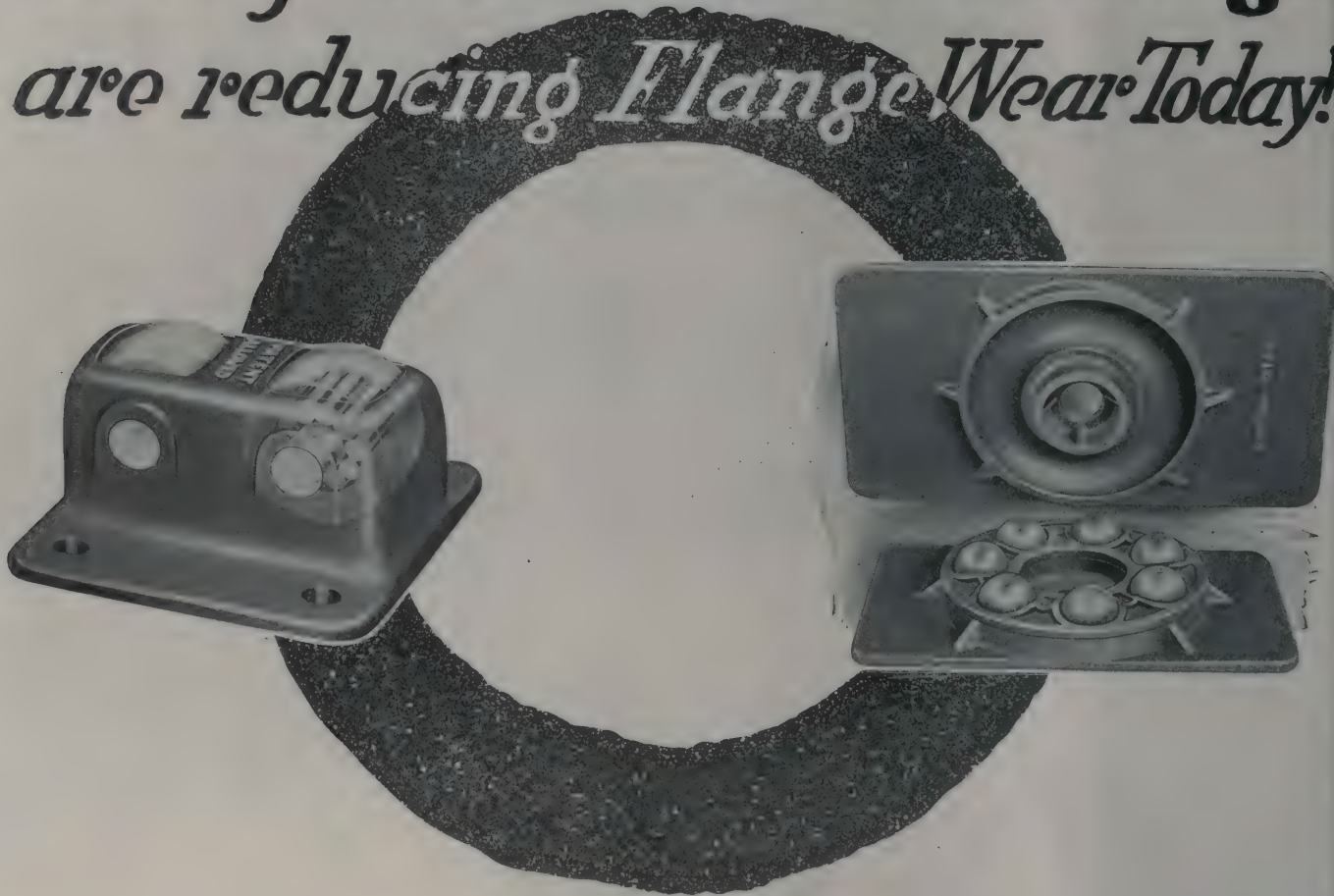


The Electric Railway Improvement Co.
Cleveland

200,000

Perry-Hartman Bearings

are reducing Flange Wear Today!



Double the life of your wheels—cut your pull-ins for wheel renewals by fifty per cent, decrease nosing, lessen flange and rail wear, reduce power consumption on curves and eliminate curve lubrication costs by using Perry-Hartman Bearings.

Ninety-five railways of the United States and Canada are securing these re-

sults today on both old and new equipment—their constant repeat orders are forcible testimony.

Send us sketches of your bolsters, present center plates or bearings and we will show you how Perry-Hartman Bearings can be quickly and economically applied—and without obligation on your part.

Holden & White Inc.

Electric Railway Distributors for the Joliet Railway Supply Company

1508 Fisher Building, Chicago

National Railway Appliance Co., New York and Washington; Grayson Railway Supply Company, St. Louis; C. E. A. Carr Co., Toronto; W. M. McClintock, St. Paul; Alfred Connor, Denver; O. H. Davidson Equipment Co., Salt Lake City; F. F. Bodler, San Francisco; S. I. Wailes, Los Angeles; W. F. McKenney, Portland, Ore.

Sand and Sixty

on the South Shore Lines



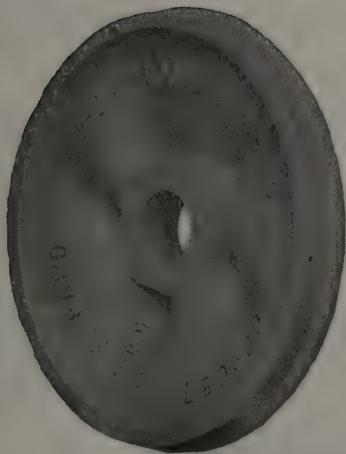
DAVIS STEEL WHEELS

"We've just ordered another carload of Davis Steel Wheels," says the Superintendent of Power and Equipment on the Chicago, Lake Shore and South Bend Railway.

Their 55-ton equipment hits 60 miles per hour in stretches on the sandy south shore of Lake Michigan. They are getting the mileage, *with safety*, from Davis One-Wear Manganese Steel Wheels.

Uniform wheel diameter is important in their A.C. motor operation. By eliminating expensive re-turning of treads and flanges they obtain a better power factor—more economical operation.

The testimony of the South Shore lines warrants your serious thought.



The Standard
for
Electric Railway Service

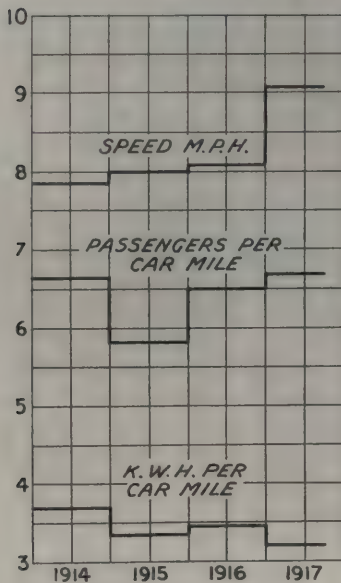
AMERICAN STEEL FOUNDRIES

1100 McCORMICK BUILDING

CHICAGO

Meter the Car Energy

Note what they did in



Showing the Reduction in Power Consumption Accomplished by the Tri-City Railways after Installing Economy Meters on their Cars

It's one thing to spasmodically cut down power consumption. It's quite a different thing to hold that gain over a period of years. That's the real test!

And that's what they did in Davenport—made the gain and held it!

In June, 1915, the Tri-City Railways installed ECONOMY METERS on their cars. A reduction in power consumption was apparent at once.

In November, 1917, the company had not only held the saving, but materially increased it.

The accompanying chart, taken from the ELECTRIC RAILWAY JOURNAL of Dec. 15th, shows the downward trend of the energy consumption curve, notwithstanding an increase in schedule speed.

The Journal article, describing the Tri-City Railways' experience with meters, says in part:

"The records covering the entire Illinois and Iowa electric railway properties for the last four years and averaged over all the lines for each year, show an increase in passengers, per car mile, of .9 per cent and per car hour of 15.9 per cent and, despite these increases, a decrease in energy consumption per car mile, of 13 per cent. * * * *

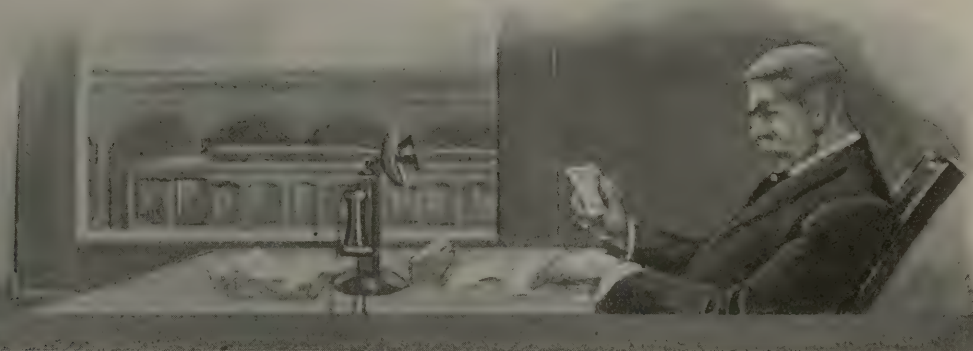
"Other than the installation of meters, there has been no change in particular on the system which would tend to better the energy consumption."

METER THE ENERGY—That's What You Want to Save

ECONOMY ELECTRIC DEVICES CO.
Exclusive Sales Agent Sangamo Economy Railway Meters
 Old Colony Bldg. Chicago, Ill.

-and Save the Fuel!

avenport



This device on your cars will start paying for itself AT ONCE.

It posts the motorman on the least wasteful method of using the motive power.

It shows him how he wastes energy by failing to accelerate quickly enough.

It points out to him the cost to his company when he continually "fans" the brakes.

It proves to him that proper coasting saves energy and improper coasting wastes it.

It teaches him how to safely handle his car in the most economical manner and stimulates him to greater efficiency in competition with his fellow workers "on the front end."

It enables electric railways to effect generous savings at the coal pile.

We shall be pleased to supply you with any desired technical data and to quote you on your requirements.

The Economy Meter promotes more economical use of energy in car operation. It is easily installed by connecting in series with the car circuit breaker. It displays the car motor energy consumption on cyclometer dials like a fare register. These readings are the basis for checking the performance of motormen. Comparison of the records induces sustained effort to excel. Thus energy is saved.



**The
ECONOMY Meter**
"The Watchdog of Your Power"

**RUGGED
TIME-TRIED
EASILY INSTALLED
Low in First Cost
Low in Maintenance**

METER THE ENERGY—That's What You Want to Save

ECONOMY ELECTRIC DEVICES CO.
Exclusive Sales Agent Sangamo Economy Railway Meters
Old Colony Bldg. Chicago, Ill.



Conductresses on National Pneumatic Cars In Modern New York

National Pneumatic Door and Step Control SPEEDS THE CAR

Perhaps, when your conductor is just beginning his day's work—and has nothing else to divide his attention—he can operate the door and step mechanisms by hand practically as fast as by means of air.

But on a schedule of eight stops per mile, eighty stops an hour, eight hundred stops a day, Mr. Conductor or Miss Conductress

would soon have to slow up and lose one second or more at every stop.

Whereas the operation of doors and steps by air—

Is just as snappy, just as speedy and just as safe at the crest of the rush hour—

As it was for the first stop made out of the carhouse.

**Almost Every Peter Witt Car in Use Is
Equipped with National Pneumatic
Door and Step Control**



NATIONAL PNEUMATIC COMPANY

50 Church St. New York



515 Laflin St. Chicago



A Motoress on a Car In Ancient Rome

National Pneumatic Door and Step Control GETS THE FARES

One of our shrewdest electric railway men said lately that air brakes would pay for themselves if they did no more—

Than remove the temptation of the motorman to skip intending passengers.

Exactly the same reasoning holds for the use of air-operated

doors at either end of the car—

Because the operators of front-entrance cars will accept every person who offers to ride—

While the conductors of rear-entrance cars will be much more likely to re-open the doors for the last-second customer.



**The Safety Cars Equipped by the Safety
Car Devices Company Include
National Pneumatic Engines**



NATIONAL PNEUMATIC COMPANY

50 Church St. New York



515 Laflin St. Chicago

National Pneumatic Door and Step Control

HOLDS THE EMPLOYEES

It costs \$50 to \$100 each to examine, investigate, train and accept a platform recruit.

And until this employee has had at least three years' service, an average accident charge of several hundred dollars must be added.

To reduce these expenses and also to enjoy the public relations advantages of experienced employees, it is necessary to make platform service more attractive.

The operation of doors and steps by air not only makes this service attractive to a larger number of men, but even makes platform employment entirely feasible for women.



© Social Press Service

The first conductress on the New York Railway's center entrance cars, which are equipped with National Pneumatic Door Engines



**Women Are Now Operating Both City and
Rapid Transit Cars Equipped with
National Pneumatic Control**



NATIONAL PNEUMATIC COMPANY

50 Church St. New York



515 Laflin St. Chicago



© International
Film Service

The First Woman Guard on the New York Municipal
Railway's Rapid Transit Cars, 250 of which have
National Pneumatic Door Engines

Unfailing obedience to the patrons' desire to board the car, together with the—

Rapid opening and closing of doors with gratifying speed, absolute safety and minimizing of

National
Pneumatic
Door and Step
Control

**PLEASES
THE
PATRONS**

the "door-open" interval in winter—

Are the immediate outward proofs of satisfactory service to the public.

Deeper, though less apparent to the eye, is the development of a more courteous attitude by the platform employees who, freed from the fatigue of physical effort, find the time to—



**Think of the Passenger as a Customer
because assisted by National
Pneumatic Control**



NATIONAL PNEUMATIC COMPANY

50 Church St. New York



515 Laflin St. Chicago

Power Consumption

Why not duplicate this on

Your Cars?

July { 0.97 %
Decrease

Aug. { 2.48 %
Decrease

Sept. { 3.06 %
Decrease

Oct. { 7.96 %
Decrease

Nov. { 10.84 %
Decrease

Note the Steady Downward Trend—Think What It Means in Decreased Operating Costs



Showing recorder location on one of the 1200 cars of the Connecticut Company

"Power wasted is the true measure of the motormen's relative efficiency."

**The Arthur
Power-Saving
Recorder Co.
New Haven, Conn.**

One chief factor in producing the above results was the use of

ARTHUR Power-Saving Recorders

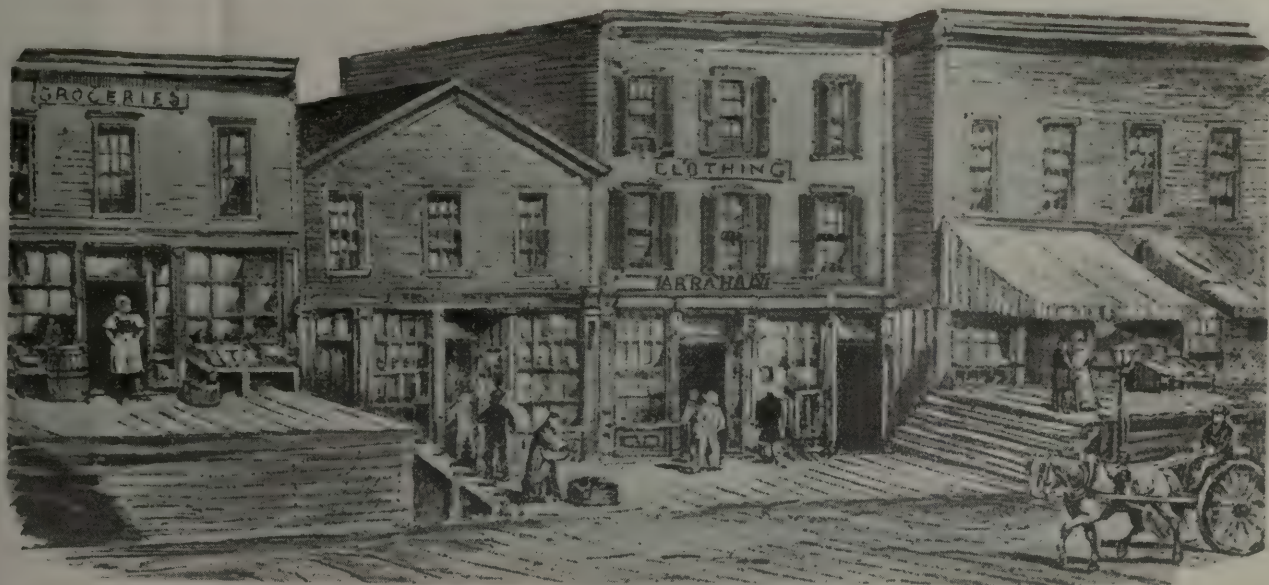
on all cars together with a systematic education of motormen in the best use of power and the best means of car operation.

The Connecticut Company
New Haven Division

July to November, inclusive.

K.W.H. Per Car Mile

Month	1916	1917	% Difference
July	2.985	2.956	0.97% Decrease
August	2.988	2.914	2.48% Decrease
September	2.973	2.882	3.06% Decrease
October	3.142	2.892	7.96% Decrease
November	3.593	3.204	10.84% Decrease



When a railroad was first put into operation between Chicago and Elgin in 1848 some Chicago merchants gravely expressed the opinion that railroads and canals would ruin the city. Before this road was opened farmers between these two cities hauled their products to town in wagons, which caused "great congestion in the streets"!

Before the Railroads Made Chicago

a lot at 144 Lake Street sold for \$100. Twenty years later—in 1853—\$64,000 could not buy this same property. Today \$250 or more is paid for a square foot of "down-town" real estate in Chicago.

In 1845 the business of one Chicago jewelry house amounted to \$3000.

Seven years later—four years after the railroad to Elgin was opened—the yearly business of that house had increased to \$126,000.

In 1905, 14 per cent of the world's railway mileage centered in Chicago and today the city is known as the greatest railway center in the United States.

In 1897 Chicago had 957.82 miles of street railways—more than twice as much as any other city at that time.

So while the railroads were a great factor in the development of Chicago as a national business center, the street railways have been just as big a factor in the growth of the city itself—a factor that made the city more desirable as a home, increased land values, and accelerated business in general.

Galena Oils

and Galena Service have helped to make possible the modern efficiency of street and interurban railways. An efficiency which has done so much to build up the great cities of the United States.

By helping the railways to solve their lubricating problems, Galena Oils and Galena Service have done their "bit" in the advancement of that industry. They will continue to contribute to this progress by anticipating the lubrication demands of our railways.

Galena-Signal Oil Co.

Franklin, Pa.



This All Steel Train of Differential Electric Dumping Cars Belongs to the Cleveland Railway Co., Cleveland, Ohio. They save enough labor within one year to pay for themselves. They make more money than passenger cars.

THE DIFFERENTIAL ELECTRIC DUMPING CAR

is low and may be loaded while in tilted position. It is Electrically operated and discharges the contents far from the tracks. It is light and quick and pleases Everybody.

Trains of them are operated and unloaded in congested districts without interfering with passenger car schedules. Ask us NOW for detailed information about this big money-saver and promoter of better public relations.

Differential Car Company, 141 Broadway, New York



TROLLEY WIRE

Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.



Weatherproof Wires and Cables

Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

American Electrical Works

NEW YORK: 165 Broadway
CHICAGO: 112 West Adams Street
BOSTON: 176 Federal Street

Phillipsdale, R. I.

CINCINNATI: Traction Building
SAN FRANCISCO: 612 Howard Street
SEATTLE: 1002 First Avenue South

Save the second to Improve Service Increase Revenue

Time is Money

to carrier and
carried

Especially in city car
operation

Where the many small
leaks of time may be

Big enough in the aggregate to cause

Poor service with low returns

Instead of

Good service with increased returns.

Modern G-E Equipment saves time

*The following pages
tell how*



General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities



Low Rate of Acceleration

The Loss

After making a certain traffic survey, a leading engineer stated that one of the principal things the railway could do to reduce downtown congestion was to accelerate its cars at 2 m.p.h.p.s. instead of 1 to 1½ m.p.h.p.s.!

And this change would also save money as against the expense of rerouting.

One second wasted per stop does not seem important. But consider the aggregate loss on a car with 8 stops per mile, at 10 m.p.h. schedule speed and 12 hours daily use of the car for 360 days a year.

Eight seconds a mile, 1 minute 20 seconds an hour, 16 minutes a day, 5760 minutes a year or

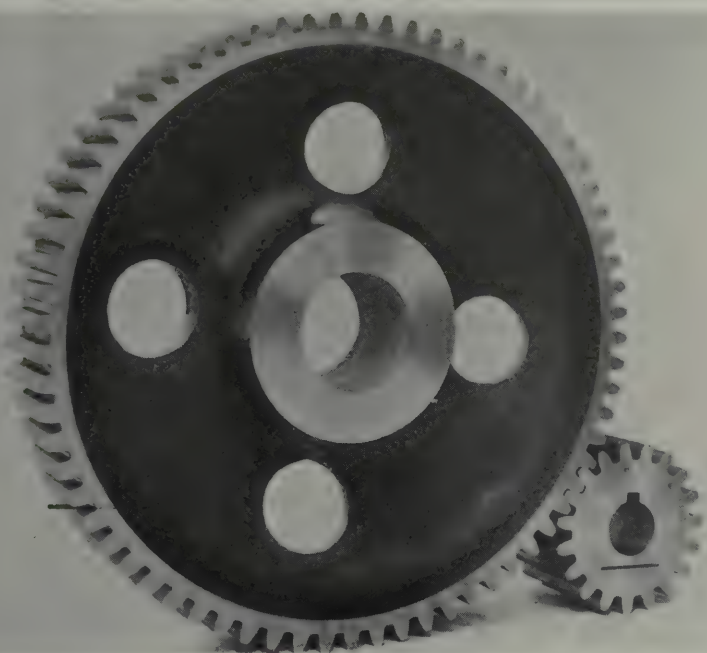
Eight Days Lost Per Car Per Annum

General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities





Low Rate of Acceleration

The Remedy

G-E equipment offers two ways to secure the time and money-saving advantages of high rates of acceleration.

A Change of Gearing

Your present motors with proper gear ratios may be able to make the desired schedule speeds with the least use of energy. In offering you its gearing the General Electric Company will consider your problems from both the mechanical and traffic standpoint.

G-E Motors and G-E Gearing

The electrical characteristics of modern G-E Motors and their high capacity relative to weight are permitting on light-weight safety cars

The Most Efficient Rates of Acceleration

General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities





Low Rate of Braking

The Loss

Entirely aside from its inferior ability to prevent accidents, a low rate of braking means costly loss of time—often as much as

10 Per Cent Difference in Schedule Speed

It follows that because of its lower rate of retardation in making normal stops—particularly when the motorman is tired—the handbrake should be used only often enough to insure its reliability when needed.

Every car, no matter how light, should have an air brake to insure the safe, satisfactory and efficient service that can be obtained only through the use of an

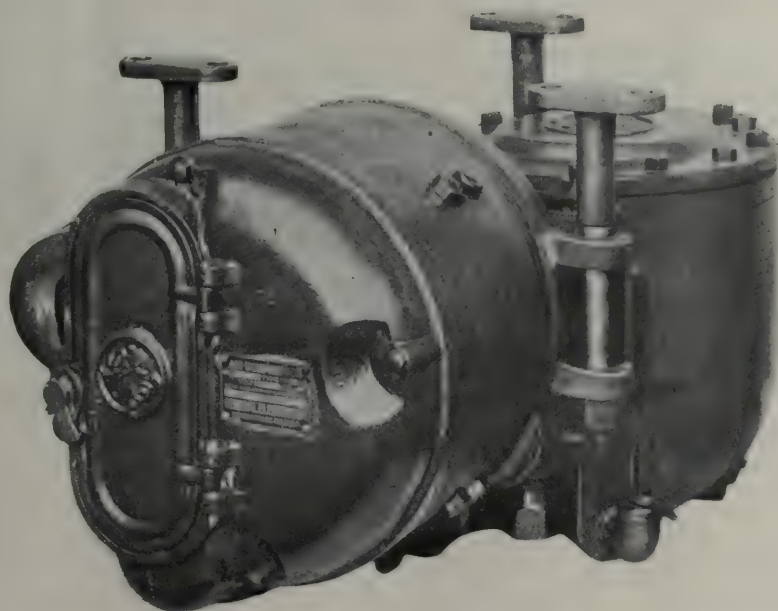
Unvaryingly High Rate of Braking

General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities





Low Rate of Braking

The Remedy

The C P Type Compressors are noted for low maintenance because of such features as a practically uniform thrust which prevents uneven wear of bearings; continuous, positive lubrication and center gear drive free from dirt. These compressors cover the entire field of modern electric rail-roading.

The General Electric Company offers an air-brake system complete in every operating detail from compressor to motorman's valve.

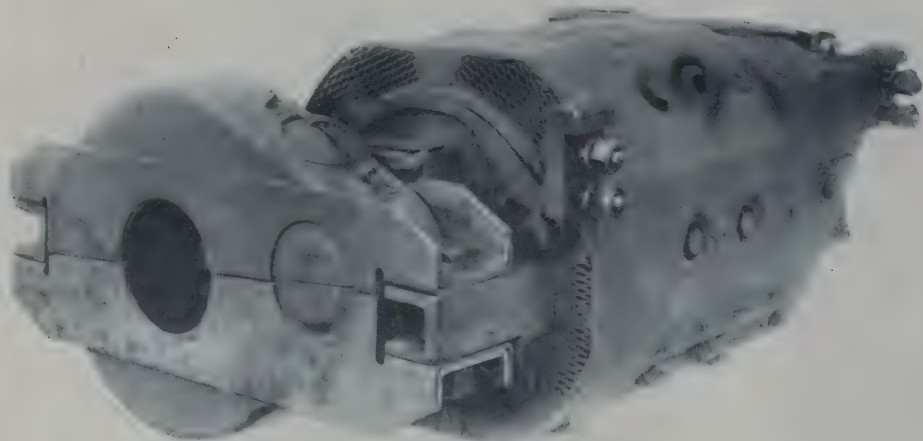
G-E Compressors and Air Brake Equipment

General Electric Company

General Office: Schenectady, N. Y.

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The G-E 247 (40 HP.) Railway Motor

High Floors and Steps

The Loss

There can be no question about the loss of time caused by high steps.

When we see a conductor leave the car to lift a child on or off or observe the deliberate movements of the parcel-laden passenger, the loss of time is evident.

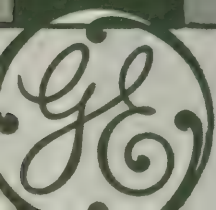
It is a fact that even the most active passenger lengthens the standing time of a car because a high floor means an extra step. At a loss of time of say half a second per step—a car carrying 60 passengers from terminal to terminal would lose 30 seconds and add

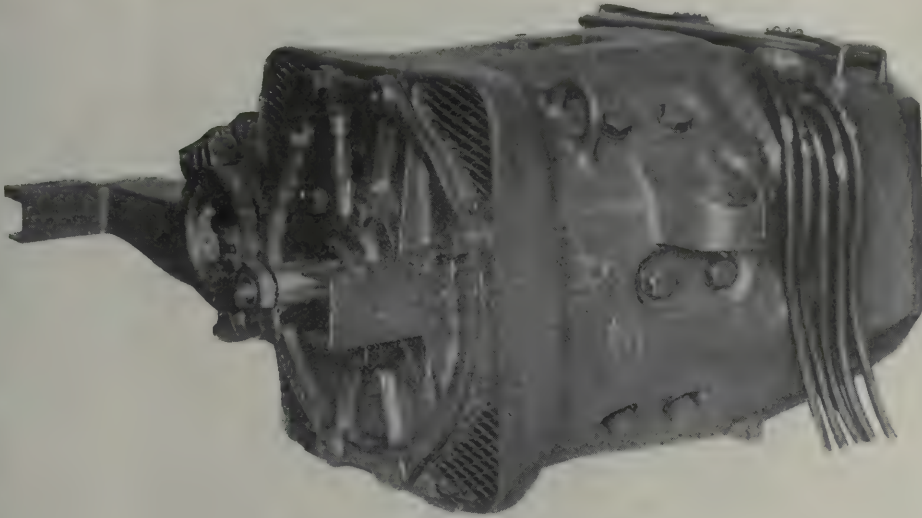
One More Minute Per Trip

General Electric Company

General Office: Schenectady, N. Y.

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The G-E 258 (25 HP.) Railway Motor

High Floors and Steps

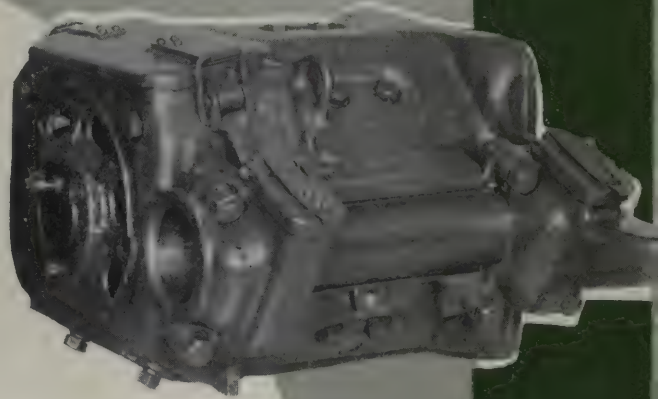
The Remedy

The G-E 258 and G-E 247 Motors are the answer to the elimination of time losses due to high floors and steps.

These motors are of dimensions which permit them to be used with 24 or 26 inch wheels, whereas motors previously available under the same car bodies required 30 inch wheels.

Operated in pairs, the G-E 258 has proved a wonderful success under the lightweight safety car; and operated in quadruple sets, both the G-E 258 and G-E 247 have proved equally adapted to the largest low-floor city cars of the day.

G-E 258 and G-E 247 Motors Are the Recognized Standards for Low-Floor City Cars



General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities





Hand-Operated Doors and Steps *The Loss*

The air-brake on city cars was once considered a luxury for the motorman.

Now we know that in speeding up schedules, the air-brake lowers operating costs and betters service.

So is it proving with air-operated doors and steps.

Hand operation of doors and steps slows down the schedule.

Nor does hand operation encourage the motorman of a prepayment car to open his doors quickly for exit—but he will do this promptly and as a matter of course with pneumatically-operated doors. By reducing opposing streams of travel

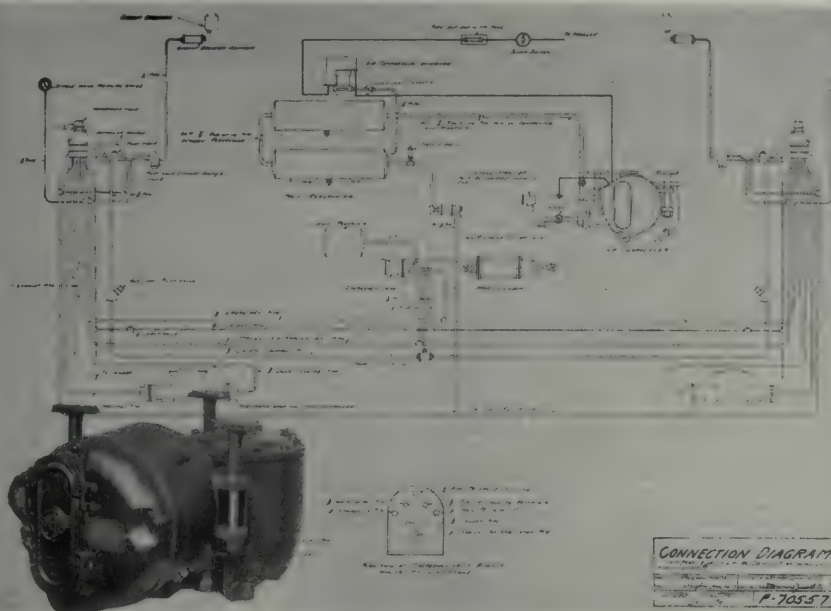
Air Operation Saves Many Seconds Per Trip

General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities





Hand-Operated Doors and Steps

The Remedy

In the combination of control, braking, door and step devices operated by air, we see the most efficient use of the time elements of acceleration, braking and stops.

But in **any** car with air-operated doors and steps so much responsibility centers upon the compressor and governor that their reliability is of extraordinary importance.

Ease of upkeep actually is vital to operators with limited shop facilities.

Early recognition of these requirements is responsible for the wide sale and successful use of the

CP-25 Air Compressor and ML Governor

General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities





Bulky Platform Equipment

The Loss

Less tangible than some of the other factors discussed has been the loss of time due to bulky equipment on the platform.

Recent developments have given this factor still greater importance. For example, on one-man cars, and many other types of cars, a single platform which receives all entering passengers must serve for control, brakes, door and step mechanisms, fare box, operator's stool and the operator himself—

Hence under these congested conditions it is more important than ever before to

**Install Platform Equipment That Is
Compact and Reliable**

General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities





The
K-63
Controller

Bulky Platform Equipment

The Remedy

The General Electric Air Brake system and air-operated doors and steps will go a long way toward clearing the platform since they eliminate the need for long brake and door-operating handles.

In addition to this is the exceptionally light and small controller—the K-63—designed for equipments up to two 40 h.p. 600 volt motors.

Sprague-General Electric P. C. Control is still another solution of the congestion problem. In addition, it provides automatic acceleration which promotes the highest possible schedule speed; most economical use of energy; absolute protection against abuse of equipment; insurance against throwing passengers by jerky manipulation and relief of motorman from detail attention to controller notching, thus allowing him to

**Take Advantage of Every Opportunity
to Make Time Safely**

General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities



General Electric Company



Schenectady Works.

The principal manufacturing plants of the General Electric Company are located at Schenectady, N. Y.; Lynn and Pittsfield, Mass.; Harrison, Newark and Watsessing, N. J.; Cleveland, Ohio; Erie, Pa.; and Fort Wayne, Ind. The total floor space is nearly 15,000,000 square feet.

To insure correspondence against avoidable delay, all communications to the Company should be addressed to the sales office nearest the writer.

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Baltimore, Md.	Lexington Street Building	Louisville, Ky.	Starks Building
Birmingham, Ala.	Brown-Marx Building	Memphis, Tenn.	Randolph Building
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Cincinnati, Ohio	Provident Building	*Oklahoma City, Okla.	Terminal Building
Cleveland, Ohio	Illuminating Building	Omaha, Neb.	Union Pacific Building
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General Electric Company

GENERAL OFFICES

SCHENECTADY, N. Y.



Electric Railway Journal

McGRAW-HILL
COMPANY,
INC.

JAMES H. MCGRAW
President

Consolidation of STREET RAILWAY JOURNAL and
ELECTRIC RAILWAY REVIEW

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Volume 51

New York, Saturday, January 5, 1918

Number 1

Some Changes in the Make-Up of the "Journal"

READERS of this paper will notice a number of changes in typographical appearance in this issue, notably in the type used in the captions of articles and in the three-column arrangement in the news department. The fundamental purpose of the former is to utilize the best in the printer's art to "play up" the important facts so that they will appeal to the readers with a force proportionate to their import. Another purpose is to bring in the element of novelty. Just as it is refreshing to shift the furniture and pictures in a room, so in a periodical an occasional change in type face or headings makes a pleasing impression. Three columns have been adopted as standard in the news pages, instead of two, partly because we believe the narrower column will be more easily read, with the size of type used, and partly because of the greater variety of caption sizes thereby made possible. Another change is in the title of the "Equipment and Maintenance" department, to be known hereafter as "Construction, Maintenance and Equipment." This department begins its fifth year with this volume. Since the war began it has proved useful in segregating short articles of a practical character. The new name suggests what has actually come to be the scope of the department. The plan is gradually to enlarge it under the new name to provide full opportunity for the discussion of all live topics of the shop, the track, the line, the power house, etc. Such an opportunity is especially needed now that the war has caused a temporary cessation of the Engineering Association committee work and meetings.

Will the Government Be Able to Give Us More Coal?

NO radical and immediate change in the coal-supply situation is to be expected under the new management of the steam railroads of the country for reasons entirely beyond the control of government, however efficient. Efforts in the line of economy should not, therefore, be relaxed; in fact, they should be pushed to the limit. An excellent start has been made in enlisting the co-operation of employees, which will be urgently needed even if the federal authorities are as successful in improving distribution as we all hope they may be. The stubborn fact is that there is not enough coal to go around. From the reports of the Bureau of Mines and the Geological Survey it is clear that while the coal-mine output has been greatly augmented, the demands are more than proportionately increased, while the quality is quite inferior. The Railroads' War Board, now defunct, which formed a voluntary committee to accomplish the same purpose as that underlying the government's move, claimed that the coal shortage is largely due to poor distribution. That is, coal is purchased at unnecessarily remote points, involving more ton-mileage than is justified by present conditions. This situation can be remedied, at least in part, under the new management. Nevertheless, it must be remembered that the government possesses no magic wand by which coal can

A Review and a Prophecy

WITH the turn of the year comes the time for self-analysis. Our successes will take care of themselves. Our mistakes will persist in calling for correction.

Our industry—and by that we include the financiers, the managements, the Association and the "Electric Railway Journal"—has made mistakes. And the greatest of these mistakes has been the failure to carry out as an industry that policy of full, free and frank publicity which the Association, on the recommendation of its committee on public relations, formally adopted in 1914. Had that policy been put in operation, the railways of this second generation would not be suffering so alarmingly because of the sins of the fathers.

The electric railways have done a great work for this country; and there is still great work for them to do. No greater catastrophe, short of food, fuel and water shortage, can come to the modern community than to have its electric railway facilities crippled or wiped out. What have we done as an industry to bring this fact home to the people?

Like Elijah of old we have been living too long in the cave of pessimism, of fear, of inertia. We have failed to accept the mandate of the Lord to "Go forth and stand upon the mount" to see the world.

And now the time has come when this pessimism, this fear, this inertia must go. We must leave the cave and go out on the mountain in the light and before the people.

Let us first look into ourselves to see what we can do to give good service. Then come frankly forward and tell the people and their regulatory officials what they should do to help, and if the giving of good service really is accompanied by full, free and frank telling of our problems and burdens, the great fair-minded people of this country will give the electric railways the right to charge whatever fare is necessary to keep the railways going, growing, prosperous concerns.

be mined without labor, transported without cars, or moved long distances in infinitesimal time. Hence while some hope for relief may be justified, the surest relief is that to be secured through economy. If 25,000 tons of coal annually can be saved by the electric rail-

ways in Washington, D. C., as the Electric Railway War Board's conservation committee says can be done, then the possible total for the country is something worth while.

Help, Don't Hinder, the Electric Railways

IF THERE ever was a time when all of us—railways, public and regulators—should pull together, it is now. We are in a period of high prices and scarcity of labor brought on by the war, and electric railway operating expenses have been mounting by leaps and bounds. At the same time the needs of the country for good transportation are greater than ever before. At a period when every productive agency in the country is working at full pressure, it is most important that the urban and inter-urban transportation systems of the nation, which are an integral part of its industrial life, should maintain their efficiency at its maximum point. No community has the right at this time to oppose any plan which will allow the railways to give better service to the public or will make the demands of the railways upon fuel and labor less.

The nation has awakened to the necessity of obtaining maximum efficiency from the steam railroads. It must be equally ready to remove the hindrances to good service by the electric railways. Of what good is it to transport raw materials to a city factory if thousands of workers cannot enjoy the best possible facilities in going to and from their work that the local railway can give them? A higher fare is necessary to meet the increased expenses of operation, but there are other obstacles which exist as well to efficient electric railway operation. Some of them arise from antique municipal ordinances or popular prejudices, such as objections to the skip stop and to changes in routing, others from the opposition of the labor element to improvements which might tend to reduce the man-power required per car, and still others from financial inability to purchase modern equipment. Now is the time to get these hindrances removed. There are several reasons why this is so.

Two years ago the jitney was looming up as a serious competitor of the electric railway. The jitney was largely the production of unemployment and flourished for a while, but with the present period of high wages, labor scarcity and work for all who wish it, the jitney has largely disappeared. But it may come back to the injury of both the railways and the communities which they serve unless the companies improve this interval to make their properties capable of giving such good service that no one will want to patronize the jitney, if it is here.

A second reason why the present is a most appropriate time for analytically studying scientific operation is that municipal bodies and the public as a whole are taking a fairer and more considerate view of railway matters than formerly. This may be because they are coming to realize the present arduous conditions under which electric railways operate. The discontinuance of several electric railways and the sale of their equipment as scrap have shown that electric roads cannot continue operation indefinitely at a loss. Greater publicity also has helped the people at large to understand somewhat better the problems of the railways and the dependence of the public on good transportation.

Finally, the recent action of several commissions indicates a growing willingness on their part to grant a

rate of fare which will enable the companies to earn a fair return on the money invested in the property in public use. If the railways in general have this return, they will be able to do some rehabilitation on a scientific basis. At present and for the past few years about all that most companies could hope to do was to escape the call of the sheriff and the junk man. To earn interest on the investment in the property was beyond them and old equipment had to be used because no other could be bought.

All these improvements could not be made at once, even if the railways had the funds to spend on the new equipment, trackage, etc., necessary. The state of the industrial market would prevent that. But at least each company should know its objective. It is to help the railways to do this that Mr. Layng has written the article on economical operation which constitutes the feature of our reading pages this week. This article is based on a study extending over years of electric railway properties in all parts of the country. Many, if not most of the principles mentioned are not new, but they are mentioned in a new way and data are given to substantiate them. With an awakened sense of responsibility in this country to the necessity of good transportation, we hope that this coming year will bring better times to the electric railways of the country and a broader understanding of their burdens.

Should the article by Mr. Layng on the fundamental principles of electric railway operation help in this direction, the aims of the author and the publisher will be attained.

Making Both Ends Meet Has Been a Real Job

THE high-cost-of-living problem during the past year has been a tough one for electric railway managers to handle. The financial stability of the industry—that characteristic upon which investors have placed so much confidence—has decreased to such an extent that many a company has had marked difficulty in making its net meet its fixed charges. Many railways have found the burden unbearable, and their end has been bankruptcy and foreclosure, as shown in the extended lists published on another page. Still others have been forced farther into suspension of service or actual dismantlement.

Why have utilities offering so essential a service fallen into such a sorry plight that even the hope of successful operation under readjusted conditions after foreclosure has in some cases failed? To look at the industry from a financial point of view, the revenue-producing power, which stood up so well in the face of the jitney onslaught, is in the main unimpaired, and the revenues during 1917 have shown a fair rate of growth. But the cost of operation has increased faster. The rising costs of materials and supplies, together with heavy increases in wages and taxes, have caused a dangerous stringency in income available for a return on the investment.

Complete data are not yet available for the whole calendar year, but those already collated bear out this point. For the first half of 1917, as compared to a similar period in the year previous, electric railways with 8388 miles of line gained 3.14 per cent in operating revenues but suffered an increase of 7.67 per cent in operating expenses and a loss of 4.70 in net revenues.

The operating ratio rose from 63.40 in 1916 to 66.18 in 1917. The showing was perhaps a little better for the first nine months of 1917, when the increase of 5.87 per cent in operating revenues for only 7450 miles of line was so far offset by the 11.02 per cent rise in operating expenses that the net fell off 2.17 per cent, the operating ratio rising from 60.96 per cent to 63.93 per cent. Perhaps, with the increasingly ameliorating influence of fare increases, cantonment and other war travel and the wider development of freight and express facilities, the operating gross during the last quarter will show an even more substantial advance. It is very unlikely, however, that the net for the year will fail to reflect to a marked degree the burdensome influence of increasing costs of operation.

The railways have endeavored to meet the situation in 1917 by the institution of more economical methods, to cut down costs, and by applications for higher fares to increase revenues. In both cases traditions have been handicaps, but, on the one hand, the opposition of unprogressive managers and, on the other, the distrust of rate-making bodies, have become appreciably lessened. In regard to fare increases (we speak of the other matter in detail elsewhere), the year has been encouraging. Recent years had been so full of attempts to cut rate schedules in every conceivable way that the work of seeking general relief seemed to many almost a herculean task, but it has not been so difficult. About fifty fare increases have already been granted, and the full returns for the year's campaign have not yet been received. The commissions have as a rule met the situation with painstaking fairness, with a clear-cut recognition of their paramount rate-making powers under legislative sanction and with a frank acceptance of their share of the responsibility for preserving electric railway service. And the public, when it has been greeted with the best possible service and honest publicity, has not fought legitimate rate increases. We wonder whether the industry ought really to be proud of the fact that only its diminishing coffers finally drove it to an active public-relations campaign! To some men nothing succeeds like success; at any rate, we hope the value of intelligent public-relations work will now be denied by none.

Many more fare increases are needed, of course, but even when these are obtained it is not certain that the electric railway industry will have all the financial relief needed. It must have some direct relief from inflated costs, but this will probably come to some extent through government price control. Moreover, with more than \$126,817,000 of securities maturing in 1918 (and issues below \$200,000 are not included), and with improved service being demanded for car patrons, the industry needs new capital. It can hardly afford to compete with the government, however, either in borrowing money or in buying new facilities. The war, in short, dominates the whole situation, and the course for the next few months or perhaps years must be planned with this in mind. What does the industry need for its preservation and for the successful prosecution of the war? and how are these requirements to be most economically met?—these are the vital questions of the new year. They can be satisfactorily answered. The past year has shown how constructive co-operation and foresight on the part of railways, commissions and the public bring beneficial results in such work.

The War Should Stimulate Steam Railroad Electrification

WHEN a few days ago the government took over the steam railroads with the stroke of a pen, things that before were remote possibilities came immediately within the range of almost immediate practicality. It requires neither a prophet nor the son of a prophet to predict that if the government continues to control the railroads for a few years extensive electrification must form part of the program. This follows because, if electrified, many roads could be operated with far less coal, and sections near water power would require no coal at all. The experience through which we are now going, with manufactories and utilities handicapped and with a large part of the population suffering or fearful of approaching suffering, has made the words "save coal" an expression to conjure with. And of equal significance is the phrase "save labor." This experience will have great weight with Congress and with individuals and committees controlling public expenditure. Feasible electrification plans will command a ready hearing, even if they involve large capital expenditure, if only ability to save fuel and labor be demonstrated. Under government operation these plans could be carried out promptly, as war measures, leaving the affected roads in much better condition when returned to their owners after the war.

While railroad conditions abroad are not altogether comparable with those in this country it is true that the Swedish, Italian, Swiss and French governments have gone into electrification of the federal railways on a comprehensive scale. The Savona-Ceva electrification, described in last week's issue of this paper, is an example of what was going on in Europe until the war called a halt. Even little Belgium is considering extensive electrification when the Huns have been forced to evacuate her territory and pay her at least in part for the ruin wrought. A London dispatch, dated Dec. 27, states that the Coal Economy Committee of Great Britain has proposed, and the Minister of Reconstruction has announced, a plan for an extensive electrification, including, of course, the railroads. An annual coal saving of a half billion dollars is expected.

The case for electrification is stated clearly by Frank H. Shepard in the first article in the body of the Journal this week. Everything that he says can be demonstrated in railroad practice in this country today. If the Government wants to go ahead the manufacturers can, with Government backing, "deliver the goods." What they can do is being demonstrated in the Milwaukee electrification extension to be practically completed this year. The places to begin are those where heavy freight traffic must be carried over mountain ranges, at which points in general water power is available. Next or simultaneously come congested sections of line which throttle traffic. This will probably be enough for war-time. Fortunately we have enough successfully electrified railroad mileage to prevent any fear of operating failure from entering into consideration. Of course, electric locomotive design is not yet standardized but for that matter neither is that of steam locomotives. With competition eliminated for the time railroad men and electrical engineers might well combine forces at this juncture to show the Government what could and should be done to increase the over all efficiency of our railroads by judicious electrification.

Condensed Profile of Electrification Over Mountain Ranges—Chicago, Milwaukee & St. Paul Railway



Further Railroad Electrification Important

Electrical Equipment Presents a Most Effective Way of Increasing Transportation Capacity—Considerations Why This Is Now a Timely Subject

By F. H. SHEPARD

Director of Heavy Traction, Westinghouse Electric & Manufacturing Company

IN NO other period of our history has the necessity of adequate means of transportation been more evident. We are now at war, and one of our most important duties is to transport a vast amount of goods over long distances. Even under ideal conditions this would be a herculean task, but unfortunately for the last five years or more the railroads have been obliged, mainly because of adverse legislation, to follow a halting program of development and this condition is proving a most serious handicap to the prosecution of the war. Had there been in Public Opinion, which after all governs our legislation, a better comprehension of the requirements of our steam railroads, the present burden on the nation and on each individual would be materially less. But at least we are now fully alive to our lack of foresight, and we should be prompt to correct this ominous situation.

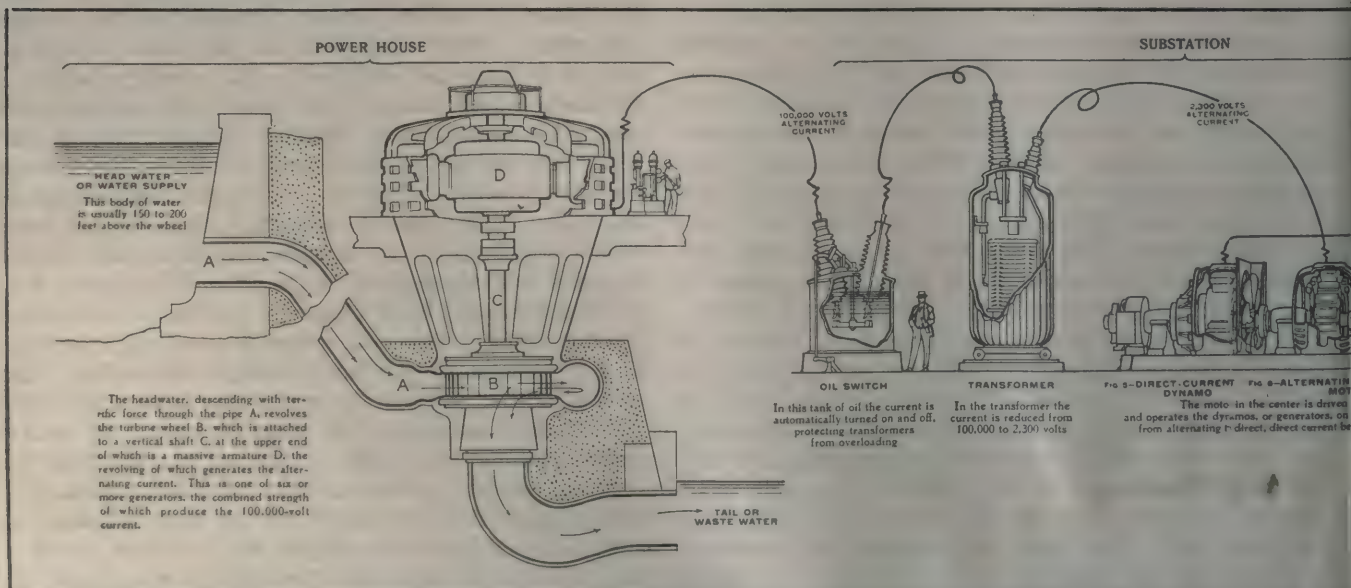
The need for increased transportation facilities has long been apparent to those well informed in such matters. Experience has shown that the traffic on our railroads about doubles every twelve years and that an annual capital expenditure of \$1,000,000,000, at normal

price levels, is needed to keep pace with this expansion. Since, for the last few years so much less than this has been invested, the sum now necessary to bring our railroads up to the point where they will be adequate to the needs of the nation is literally enormous. No such capital being now available, normal methods can no longer be followed, and therefore in the present emergency any and every means to utilize our existing railroad plant to its fullest efficiency should be carefully considered.

The Railroad War Board, despite legislative handicap, has already made phenomenal progress toward unifying the railroads' facilities, and if these handicaps were removed, it could practically eliminate all duplication of service by the common use of terminals, tracks, and equipment and by a thorough revision of traffic routing.

When all this is accomplished, however, a further improvement in the transportation situation can be secured by means of electrification.

Electrification can help the railroads and the nation in three ways:



PICTORIAL REPRESENTATION OF USE OF HYDROELECTRIC POWER FOR RAILROAD

- 1—By increasing the capacity of existing track and terminal facilities.
- 2—By decreasing the consumption of fuel, and
- 3—By conserving the labor necessary for operation and maintenance.

INCREASING TRACK CAPACITY

Any method by which the capacity of our steam railroads can be increased would be of paramount importance at this time. Electricity can accomplish this by permitting the use of locomotives of larger power, higher speed and greater mobility than is possible with steam operation. The largest type of electric freight locomotive built by the Pennsylvania Railroad is capable of developing 7000 hp. for brief intervals and 4000 hp. continuously, regardless of weather and other conditions that reduce the capacity of a steam locomotive. This is nearly the limit in power for a single road locomotive with the drawbar strength of the freight equipment now in general use. With all-steel equipment, heavier trains can be run, and under special conditions it is entirely practicable to operate trains requiring an input of 20,000 hp., including both road locomotive and helper. Such a concentration of power as this will obviously expand enormously the traffic possibilities of existing track facilities and will make additional tracks unnecessary.

The efficiency of electric operation in the most exacting service has already been demonstrated. On the Norfolk & Western Railroad, electric locomotives have replaced high-powered steam locomotives of the most efficient type, and have eliminated all congestion on the grades and, it is estimated, have doubled the capacity of this system at an expense that is considerably less than the cost of a corresponding increase in the number of tracks. In this instance, the power input for single trains is about 11,000 hp. for starting and 8000 hp. for continuous operation.

Furthermore, the electric locomotive is ready to start at any time, needs no fuel or water supply, can run in either direction, accelerates very rapidly, and has great overload capacity. All of these features simplify and expedite yard movements and train dispatch-

ing and thus increase the capacity of existing terminals for traffic movement.

THE CONSERVATION OF FUEL

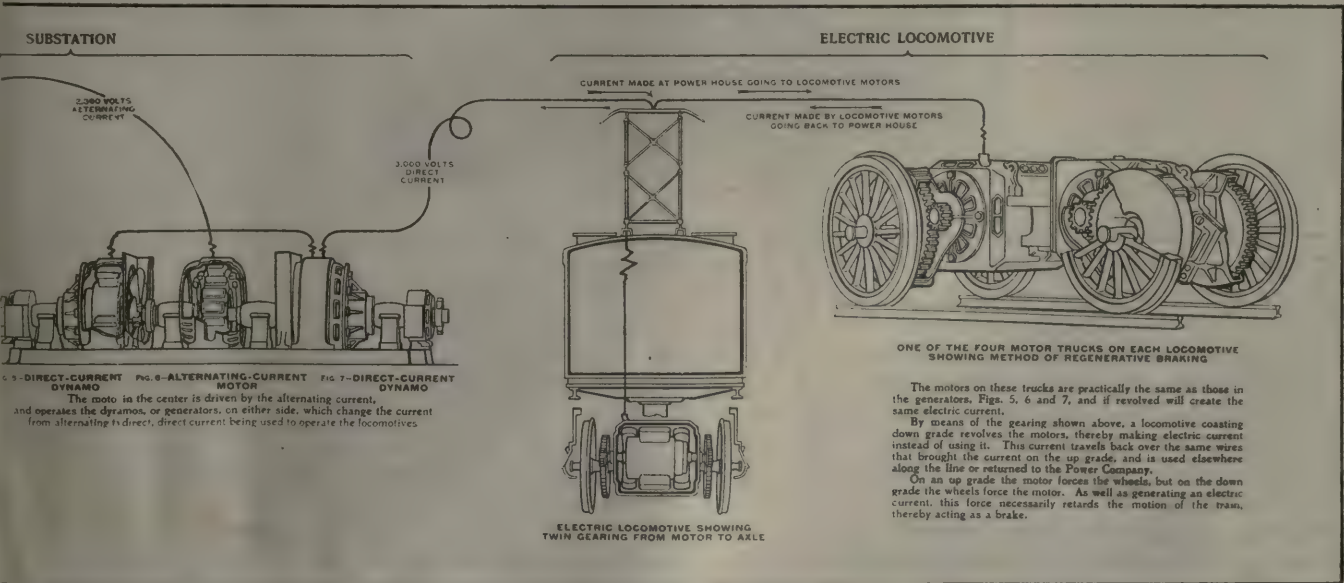
The aggregate power generated in our steam locomotive boilers is about 50,000,000 hp., and to produce this one-quarter of all the coal mined in the United States is consumed. By a somewhat curious coincidence this total horsepower is just about equal to the amount of water power that is going to waste in this country. Hence, it is apparent that if our hydroelectric power was used for railroad operation, 150,000,000 tons of coal would be saved annually, and the cars and crews needed to haul this coal would be released for other purposes. Actually the case is far stronger than this, for owing to the fact that the load factor of the individual locomotive is less than 25 per cent, power stations having a combined capacity of 12,000,000 hp. would suffice to operate our entire system of railroads, thus still leaving 35,000,000 hp. of water power available for other purposes.

For geographical reasons it is of course impossible to generate all railroad power hydraulically, and steam stations must in any event be relied upon to supply part of it. But 1 lb. of coal will produce as much power at the locomotive in a modern electric power plant and transmission system as 2 lb. or more under a locomotive boiler. Hence when this economy is combined with the reduction in the total capacity required, due to the low load factor of the locomotive, it is evident that enormous savings in fuel are possible even when steam stations are used. Irrespective of considerations of economy, our right to deplete our fuel resources in the face of this vast waste of water power is decidedly questionable.

HOW ELECTRICITY SAVES MAN POWER

The third important result secured through the electrification of the railroads is the conservation of labor. This is accomplished in several ways.

In the first place, by effecting a great saving in coal consumption, electrification releases an army of mine and railroad workers for other purposes. Re-



lief of this kind would be especially beneficial at this time, as well as of great economic importance after the war.

Secondly, since the use of electricity increases the amount of power that can be concentrated in a single locomotive and permits the operation of longer trains at higher speeds, a given number of men can handle a much greater volume of traffic on an electrified road than they can on a steam road.

Again, electric locomotives require much less labor for maintenance than steam locomotives. On the Chicago, Milwaukee & St. Paul Railroad the electric locomotives run 500 miles before receiving terminal attention, whereas steam locomotives are ordinarily taken to the roundhouse after runs of 100 miles. On the Norfolk & Western, twelve electric locomotives

A number of factors are directing constructive thinking in many quarters toward electrification at the present time, and of these the following are most important:

1. The present scarcity of labor, which will undoubtedly continue after the war.

2. The scarcity and high cost of fuel. While present prices are not likely to obtain in the future, it is the general belief that they will never drop to their former level.

3. The inevitable growth of traffic in the United States which will necessitate increased traffic capacity. Electrification in many cases provides the cheapest means of increasing capacity, especially in settled communities and in mountain sections where increasing the width of the right-of-way for additional tracks



have replaced thirty-four Mallet steam locomotives, so that between the greater capacity of the electrics and their greater time in service, the reduction in the amount of labor necessary to operate and maintain them is most marked. Moreover, because of the simple construction of electric locomotives, even major repairs, such as the replacement of a motor, can be accomplished in a few hours, in striking contrast to the length of time required for important repairs to steam locomotives.

Finally, because electric locomotives are independent of fires, steam pressure, fuel and water, electric operation secures an economy of yard and terminal labor.

would be either enormously expensive or practically impossible.

4. The increasing capacity and efficiency of hydro-electric and steam generating plants, which are constantly tending to augment the relative economy of the electric locomotive as compared with the steam locomotive.

5. The increase in the size of transmission systems throughout the country not only makes electric power more readily available to the railroads but increases the facility and ease with which the fluctuating railroad loads can be carried.

6. The improvements in trolley design and construction, which are constantly reducing costs per track-



**PHILADELPHIA PASSENGER TERMINAL
BROAD ST. — PENNSYLVANIA R.R.**



**NEW YORK FREIGHT TERMINAL
N.Y., N.H. & H.R.R**

ELECTRIFICATION HAS PROVED THE MOST ECONOMICAL MEANS FOR CARING FOR TRAFFIC AT TERMINALS LIKE THESE

mile." Because of the number of track-miles involved, this reduction of the cost of overhead construction will have an important influence on railroad electrification.

7. Improvements in the standards for freight car equipment which will permit trains of greater tonnage to be hauled in the future. The power capacity of electric locomotives being practically unlimited, these heavier trains can be hauled electrically over existing grades, but to handle them with steam would require most extensive grade revisions.

8. Greater regularity and reliability of operation. One of the important results of every electrification has been improvement in service. The New York Terminal locomotives of the Pennsylvania Railroad have, for example, a record over a term of years of 100,000 locomotive-miles for each case of detention. Such accomplishment in maintenance of schedules directly increases capacity.

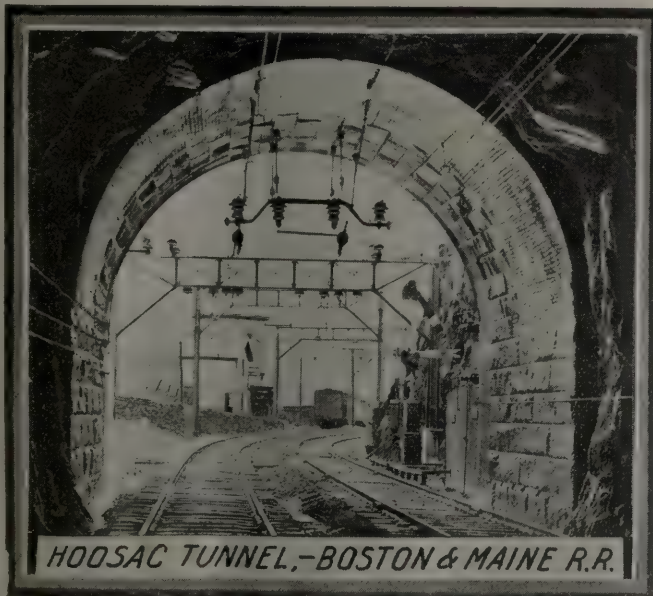
THE IMMEDIATE OUTLOOK

With the unification of the direction of the railroads by the action of the President it is expected that capital expenditures during the war will be governed by

broad consideration of traffic necessities, conservation of fuel and conservation of man power. In those situations where traffic congestion is most acute relief will be available in some cases through the utilization of existing electric generating stations, so that the construction involved would be limited to that of locomotives, substations and trolley installation, and would therefore involve a minimum diversion of effort.

The means by which this can be accomplished remains to be developed. If the improvements are for the benefit of the nation and the property concerned, the financial means will be forthcoming.

A hopeful view of the situation is that full opportunity for the continuance of individual incentive and ability will prevail, so that the splendid achievement, so characteristic of past American railroad history, will obtain in the future. The further upbuilding and improvement of the transportation facilities for the country should unquestionably be the dominating part of our activity after the war, so that certain electrification, desirable but deferred, should now be planned for, to form part of the nation's immediate constructive program as soon as opportunity affords.



HOOSAC TUNNEL, — BOSTON & MAINE R.R.



ELKHORN TUNNEL, NORFOLK & WESTERN RY.

ELECTRIC LOCOMOTIVES ALSO SAVE THE COST OF ADDITIONAL TRACKS IN CONGESTED SERVICE ON MOUNTAIN DIVISIONS

Applying Engineering and Selling Principles to Electric Railway Transportation

By J. F. LAYNG

*Railway and Traction Engineering Department
General Electric Company*

A Discussion of the Present Situation and Its Connection with the Conservation of the Nation's Resources; of the Electric Railway's Need for Statistical and Analytical Data; of the Economies Possible with Better Equipment and Scientific Running in Co-operation with Regulatory Bodies, and of Improved Relations with the Men

The Situation To-Day

The Need for Conservation of the National Resources in Fuel and Labor Intimately Connected with the Electric Railway's Problem of Meeting Automobile Competition and Higher Costs of Operation

THE electric railways are faced by something actually worse than the question of the price of their necessities—they are likely soon to be told by the government that they must give an accounting for the efficient employment of every kilowatt hour of energy, of every ounce of material, and of every hour of labor that they use, no matter what prices they pay for them. The question of fuel is in the foreground now, but as the war advances this "show me" attitude may be carried over to many other items.

Many of the betterments possible on electric railways, like longer spacing between stops, the rerouting of cars, the application of anti-blockading ordinances are not up to the railways but are dependent upon the good will and intelligence of the public and its representatives. Such relief would not only go far along the road of patriotism, but prove a permanent benefit to electric railways and to the communities which they serve. Other betterments, such as improved cars, in many cases, have been beyond the means of the properties which have been forced to use the cars they had because they could not afford to purchase the latest models. The suggestions made in this article should therefore be understood as applying only to those conditions in which their introduction is practicable.

**10,000,000
Possible
Competitors**

At the very beginning of any campaign to improve electric railway conditions we must take into account the highly wasteful competition of the automobile. It is possible that the need for conserv-

ing gasoline may lead to the prohibition of the automobile for pleasure riding. This, however, would be only a war-time measure. Then the automobile would resume its present attacks on the stability of the electric railway industry unless it could be met by thoroughgoing changes in present methods of operation.

That this competition is serious is known to most managers through individual experience. Yet how

many of us realize its scope throughout the nation at large? Perhaps the following figures, furnished on Nov. 28, 1917, by the Automobile Chamber of Commerce, may prove not only enlightening, but startling.

Of 4,243,139 self-propelled vehicles in the United States in use up to July, 1917, 3,843,139 were pleasure cars and 400,000 are auto-trucks.

During 1916 the United States produced 1,617,708 passenger automobiles and 90,000 trucks; and during the fiscal year ending June 30, 1917, 1,693,994 passenger cars and 112,200 trucks. In addition to these figures, the Automobile Chamber of Commerce in New York offers such staggering data as the following:

Wholesale value of motor-driven vehicles produced last fiscal year.....	\$917,470,938
Capital invested in automobile and motor truck plants.....	\$736,000,000
Body parts and accessories, capital.....	\$1,000,000,000
Capital invested by automobile and truck dealers, garages and supply houses.....	\$920,000,000
Employees of automobile and truck companies.....	280,000
Employees of manufacturers of accessories and body parts..	650,000
Employees of dealers, garages and supply houses.....	368,000

The pleasure cars alone call for an expenditure of \$200 a year each, making the stupendous total of \$768,627,800, which actually exceeds the present annual receipts of electric railways by more than \$150,000,000! But the end is not yet, for even if 500,000 automobiles were scrapped during 1917, the net addition to the ranks would be 1,500,000. Since automobile manufacturers place the saturation limit of the United States at 10,000,000 machines, continuation of present electric railway practices would make automobile competition three times as severe as to-day!

It would be folly to hope that this development will be seriously checked either by temporary war conditions or by the exhaustion of gasoline.

In offering the following ideas for the betterment of existing electric railway practices, for the two-fold purpose of conservation of our national resources and the maintenance of electric railway service for the public, we would not have the reader infer that even if all of these ideas were to prove as good in performance as in prophecy, the need for more revenue from transportation would vanish. There are roads to-day, for example, which would still require more revenue if they got their energy for nothing.

Of all the departments, that of conducting transportation offers the greatest possibilities in the way

of economies and larger receipts, largely because in the past electric railway companies have had less of a free hand in this department than in any other. Should new apparatus promise a saving of a considerable percentage in the power station, the cost of the new equipment is balanced against this proposed saving, and if a definite advantage is to be gained, the company will order the equipment. In the transportation department, however, where a new system of routing, longer spacing between stops or other improvements promise an equal saving, quick action is not so possible. The authorities, represented by the commissions or municipal authorities, have to be consulted. Moreover, the public is usually very conservative as regards changes in transportation methods, and the labor element is also very jealous of what it considers its prerogatives.

Possibilities in Transportation

Nevertheless, in the study for economy, the transportation department deserves vastly more attention than the engineering department, partly because its expenses represent such a large part of the total expenditures for operation and partly because its methods being less susceptible to mathematical laws than engineering practice, there has been less uniformity in them. In spite of this fact, railway companies are standardizing more and more on transportation methods in their effort toward economical operation in order to make the present campaign for higher fares 100 per cent perfect.

* * *

The Railway Manager Has the Biggest Job in Town

Therefore His Problem Is to Secure the Principal Community Statistics. Some Sample Graphs Are Presented, Chiefly from Chamber of Commerce Records

IN NOVEMBER, 1917, during the coal stringency the railways of Kansas City received preference to private consumers in fuel allocations while, in December, the Cleveland Railway received preference over lighting—an eloquent tribute to the primacy of the electric railway.

Knowledge Is Power

But now let us go to a more specific matter in illustrating the old saying "Knowledge is Power," namely:

Since the railway manager has the biggest job in community development, he ought to know more about the past, present and future of the town than anyone else. Otherwise how can he shape the policy of his company to conform to changed conditions or prove to the investor that his town is coming instead of going?

In a growing community a railway manager can get a great deal of helpful information from the following:

First—Graphs of the increase in population according to the shortest intervals available. Figs. 1 and 2 present such graphs for two American cities, both being reproduced to show how the ratios of increase may differ. Nor should we stop here. If at all possible, similar graphs should be made by districts, to determine

where track should be put down and where track should be pulled up.

Second—Graphs of growth of employment establishments and wage earners. Fig. 3 shows that these two elements in city growth are by no means parallel. A slight increase in shops against a big increase in men discloses a greater likelihood of congestion than if the shops also had increased in the same ratio. Factory capacity is usually increased vertically or by annexes; but factory number is usually increased by new construction in another district. Some railways, in the absence of these graphs, have overlooked developments like these; or, contrariwise, have continued excess service to a rundown factory district.

Third—Graphs which indicate the financial progress of the community, such as value of products, capitalization, cost of material and wages (Fig. 4) and the bank clearings (Fig. 5). Bank deposits should also be plotted. Such graphs as these will speak in mighty convincing tones alike to the banker, the board of directors, the management and the community.

* * *

Keep Graphic Records of Railway Statistics

How the Expenditures of Each Department Can Be Checked Against Preceding Years and Their Corresponding Gross Earnings

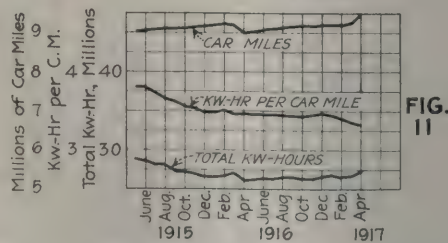
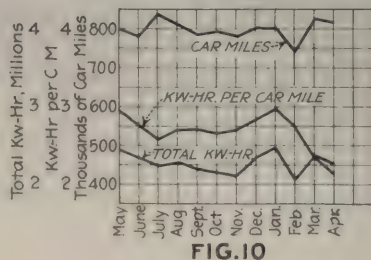
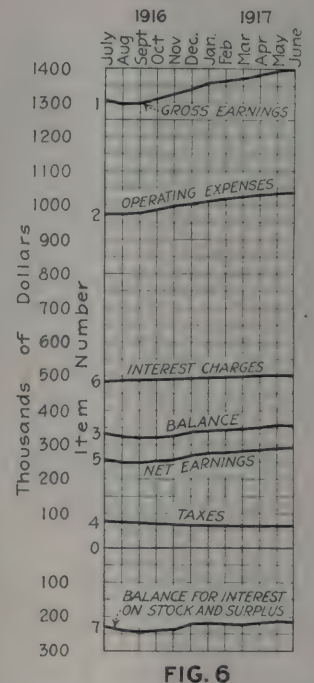
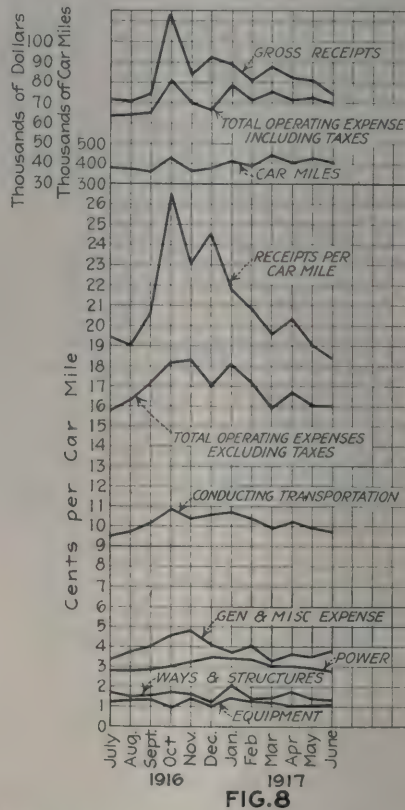
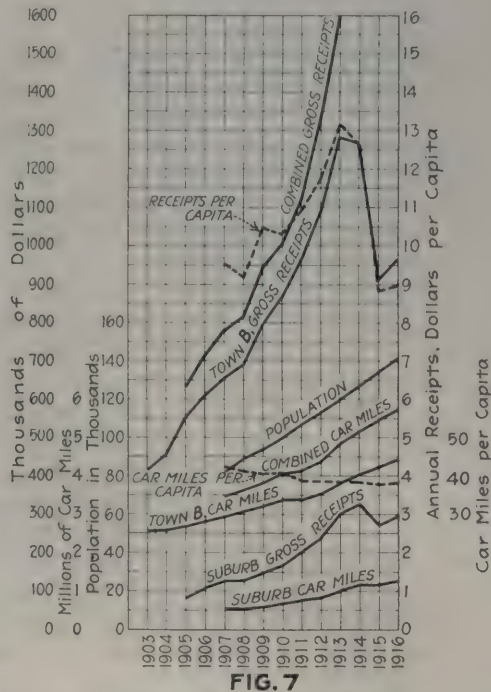
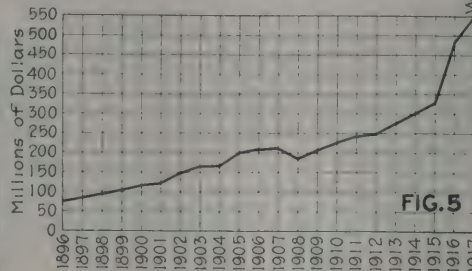
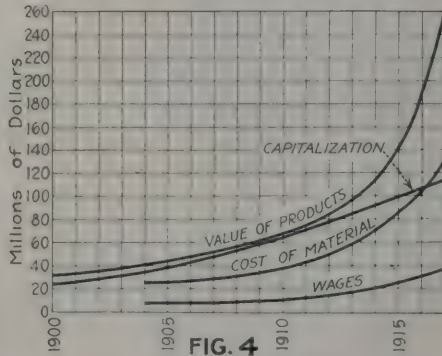
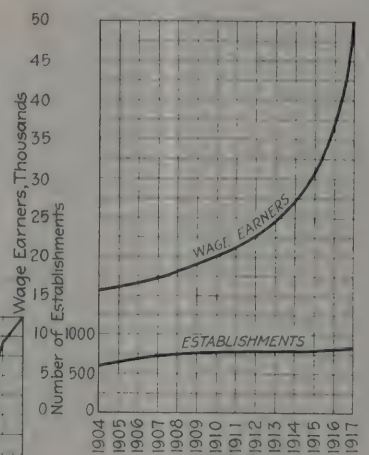
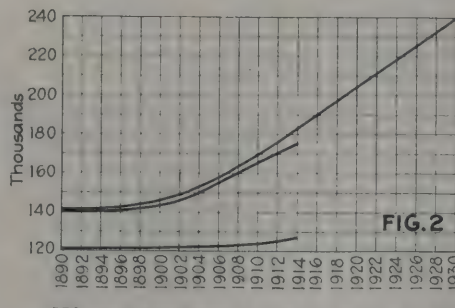
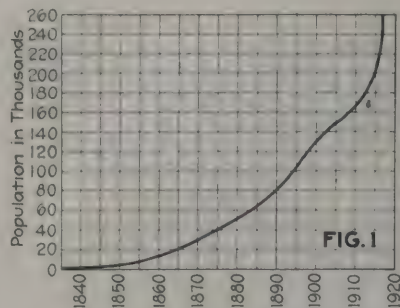
IF IT IS important to chart community statistics, it is vital to chart company statistics. Some men are mathematical wizards who can see a picture in the mind's eye; but most of us, including the board of directors, need direct, concrete charts.

To know how the general finances are tending, most managers keep graphs of the gross earnings, operating expenses, interest charges, net earnings, taxes and the remainder necessary for paying the interest on stocks, bonds, mortgages and reserve funds. They are usually made on what is commonly known as a twelve-months' ending curve, namely, each point on the graph represents the business of the preceding lunar year, like January to December, February to January, inclusive, etc. When we plot the graph on this basis, the influence of fluctuations is decreased so that it is easier to form a direct idea of general tendencies in either the increase or decrease of the different items. This is illustrated by Fig. 6.

Other important studies are the preparation of graphs to show the gross receipts, increase in population and car-miles. On the same chart are plotted receipts per capita, car-miles per capita, etc., as in Fig. 7.

Comparisons of Departmental Expenditures

To find if the expenditure of the various departments varies in the same ratio as the gross income of the company, graphs are prepared of the gross receipts, total operating expenses and car-miles, as in Fig. 8. It is good practice to show the gross and operating expenses in total dollars, while plotting directly underneath it the receipts, operating expenses, cost of conducting transportation, power, maintenance of way and structure, maintenance of equipment and general and miscellaneous expenses in cents per car mile. With the car-mile basis, the manager can see at



GRAPHICS OF ELECTRIC RAILWAY TRANSPORTATION—PLATE I

Fig. 1—Growth in Population, Town A

Fig. 2—Growth in Population, Town B, from Top Down, Combined, City and Suburbs

Fig. 3—Relation Between Growth in Numbers of Wage Earners and Establishments

Fig. 4—Relative Increases in Value of Products, Capitalization, Cost of Material and Wages, Town A

Fig. 5—Record of Bank Clearings, Town A

Fig. 6—Company Records, Town B, Suburbs Included

Fig. 7—Company Records, Per Capita Data, Town B, Suburbs Included

Fig. 8—Total Departmental Data, Town B, Suburbs Included

Fig. 9—Gross Receipts and Operating Expenses Per Car-mile, Town B Alone

Fig. 10—Car-miles and Energy for One Year by Months

Fig. 11—Car-miles and Energy for Two Years by Months

once if departmental expenses are increasing or decreasing in proportion to the railway's gross earnings. An opportunity to compare relative total operating expenses and receipts on a cents per car-mile basis is presented in Fig. 9.

It is suggested that these graphs be made on charts of wall-map size, not only for easier reference, but for use in discussions with employees, the public and regulatory bodies.

Of course, in making comparisons of total and departmental expenditures we should be sure that apparent savings in way or equipment maintenance, power or transportation expenses are really savings. They may be merely transfer charges, as when a saving in power possibly is transferred to the cost of transportation. Therefore, each saving must be considered in the light of what effect it will have on other costs.

The importance of departmental studies like Fig. 8 is emphasized by comparisons with the statistics of the United States Census Bureau. Its 1912 report shows that of the gross income of all the electric railways of the United States, the 58.18 per cent operating ratio was divided as follows:

Maintenance of way and structures	8.17 per cent
Maintenance of equipment	7.06 per cent
Transportation	24.42 per cent
Power	9.00 per cent
General expense	9.53 per cent
Total	58.18 per cent

We all know that the recent exceptional increases in the price of labor and material will raise this percentage. Thus the figure for transportation expenses is nearer 35 and 40 per cent than 24.42 per cent.

It would seem advisable also to include the depreciation, contingency funds, taxes and terminal charges in the operating ratio to obtain a true idea of what it really costs to conduct electric railway business.

* * *

What Lines Are Making or Losing Money?

Costs and Earnings of Individual Lines Should Be Known to Give Service with Satisfaction to the Public and Profit to the Railway

THE same method of analyzing accounts applied to the system as a whole should be extended to the individual lines. Not to have such data is to be in the position of a manufacturer who has a surplus or deficit (more often a deficit), yet cannot place the responsibility for the result.

It is absolutely vital to know the earning value of each line by itself; and not the least important reason is the ability which it lends to a manager to prove his case when he is asked to make an unreasonable increase in service.

He knows, for example, that an extra stop slows down schedules and costs money but he must prove this to the satisfaction of the complainants in figures, for his say-so is no better than that of any other man.

Figs. 10 and 11 contrast the average car-mile earnings, car-hours and car-mileage of a certain city with those of its best-paying line. Going still further, Fig. 12, we get a contrast of all the lines individually (on another system) revealing the perceptible disproportion between car-miles and earnings per mile. The operating ex-

penses of a line may seem to be reasonable when measured on a car-mile basis but be found unduly high when measured on a car-hour basis. For this reason, if a railway has the information figured on a basis of both car-miles and car-hours, it comes pretty close to knowing what parts of the system are bringing in the net income, where service should be added and where it should be taken off.

Further Segregation of Accounts Necessary

By further segregation of the standard classification of accounts, the cost of operation of individual lines can be obtained. Thus where several lines operate over one track, the expense of maintenance and operation can be distributed in proportion to the car-mileage of the individual lines.

More refined methods of determining both costs and possible economies and improvements will be found in the traffic studies presented later. These studies will take up schedule speeds, stops, length of stops, voltage, car weights, grades, number of passengers carried in different zones, etc. By giving such points due consideration, we can find directly the cost of giving additional or decreased service. To have exact facts, of course, will put an entirely different face on arguments concerning public policy, and make it quite impossible to ask impracticable things from the railway.

When the service of the individual lines is analyzed, it is well to consider the cost or appraisal value of each of the lines which we are comparing. Frequently, a large amount of money necessarily has to be invested to construct over a bridge or some costly fill—items which are not taken into consideration when operating costs only are borne in mind.

* * *

Car Turn-back Statistics, the Proof of Unnecessary Service, Are of Immediate Value

A Periodical Traffic Analysis of Each Line, Made with the Aid of the Conductors, Will Eliminate Waste Mileage by Indicating Desirable Turn-back Points

STILL another subject of profitable study for the average road is a careful analysis of the turnback situation. Indeed, a company whose needs do not require the compilation of any extended system of graphs will yet find it worth while to take up the subject of passenger loading for turn-back points and the requirements of car capacity. The savings possible in this direction, when they are tabulated and put before the local authorities, will often help a company in receiving permission to extend its system of turn-backs. The greatest gain possible from turn-back cars is to apply them, in whole or in part, for more frequent service on the heavily traveled portion of the line or to take care of increased business without buying new cars.

To determine the turn-back points for any particular line, it is necessary to analyze the passenger loads on all cars at all hours of the day. It is just as wrong to run too much mileage as too little mileage; in one case the hardship suffered by the company is reflected in its finances; in the other, the hardship borne by the public

is reflected both in the decreased earnings and in the increased dissatisfaction. Only an actual survey will bring out these facts, as register turn-ins are useless for records of travel over different parts of one line.

All operators know that the heaviest passenger loads usually are found in the congested portions of the city. This load tapers off gradually as the car advances toward the outer terminals or drops sharply at certain crossings, like transfer points. A few lines may have one or more traffic centers, but this general fact holds.

Principle of Turn-back Is Sound

Despite general knowledge of the "turn-back" principle, "turn-back" service is not used as extensively as it should be. In some cases no attempt has been made to work it out; in others the public has become prejudiced against the system either because the car marker signs were not easily legible or because the question of whether the car should go on or turn back has been left to the will of the individual car crew instead of being placed in the hands of inspectors or of a central dispatcher.

A gratifying feature about the turn-back traffic survey is that except possibly in the largest cities, a company can very easily get, at very little extra expense, all of the information necessary for it to determine turn-backs pretty closely, from its own staff of conductors and inspectors who have already an intimate acquaintance with the cars and their routes.

Quite recently a traffic survey was conducted of all the lines in a city of 150,000 population. It was not necessary to call in any outside help. Eight regular employees transcribed all the information from the conductors' cards and made the graphs within six days from the time we began. Similar surveys have been made in cities up to 300,000 population.

Simultaneous Check by Conductors

With other systems of checking it is necessary to have so many men that usually only one line can be surveyed at a time. With the conductor's card system it is possible and usually advisable to make all observations on all lines at one time. A simultaneous one-day survey avoids errors due to the variations in gross receipts even on successive week days. It is not uncommon to find variations of 25 to 33½ per cent on individual and groups of lines; so the picking out of "typical" days with traffic survey systems other than this is extremely difficult, if not impossible.

It is not asserted that the system recommended is as complete as those of our largest engineering organizations, but it is good enough and sufficiently comprehensive so that a survey which will enable the local manager to give the best service with the least waste of mileage may be obtained. Aside from this, periodical checking of traffic for changes in turn-backs are necessary in any event.

To get these data, the superintendent or manager instructs the conductors to count the number of passengers at each point selected, as shown in the instructions on page 28.

Each conductor also receives a printed card, Fig. 13, for writing down his figures. This card carries the name of the possible "turn-back" streets, the line on which the data are taken, the date, car number, conductor's number, conductor's name, run number and trip number. It is necessary to have all these data



To turn back or not to turn back should not be left to the varying judgment of platform men.

to be certain that all cards have been turned in by the conductors and that all the facts needed for the graphs are at hand. Such a card should be about the size of a regular trip card, so that the conductor can fold and place it in his pocket.

Data Helpful to the Men

When orders for the count are issued, the conductors should be informed that it has absolutely nothing to do with register readings; that the management simply wants to secure the most even distribution of passenger loads in all cars at all times, from which it naturally follows that the work of the conductors will also be more evenly distributed when the necessary changes are made.

It is realized that at certain times of the day the conductor will not have the time to make accurate notations just at the point where the count should be taken, so he should be requested to bear this in mind and do the best he can.

Ordinarily it is best to take this traffic count for two or three days, using but one day's figures for the analysis. As the men need a little time to understand exactly what is wanted it is best to discard the first day's count. When this count reaches the office, the delinquents are reinstructed, and usually the second and third days' cards are found in good shape.

Experience shows that the conductor's counts are as accurate as those taken by paid outsiders. The difficulty with outside workers is that the observer must have some training, while an experienced conductor can tell instantly and instinctively how many passengers are in his car without one-by-one counting.

Within the downtown section or in heavy traffic districts, the count should be taken about every 1200 or 1500 ft., and in the outer sections about every 2000 or 3000 ft. On a line 5 miles long the data on ten or twelve checking points will show at a glance the extent of overloading or unloading of the cars, and consequently the changes desirable in the number and capacity of cars routed to each point. The form on pages 28 and 29 shows the distribution of data as tabulated from the cards turned in by the conductors.



Uncle Sam appreciates the need for electric railways. They are in the first ranks in the allotment of coal.

Determining the Size of Car Necessary

From the Turn-back Records It Is Possible to Get Maximum, Minimum and Average Car Loadings Hour by Hour and to Check Them Against Seating Capacity

THE data from the turn-back studies may be used for chief aid in determining another important matter: *The best size of car.*

To do this we must develop loading graphs which will show at each checking point the maximum and minimum number of passengers on all cars at hourly intervals throughout the day, the two classes of loading graph being contrasted with the straight line which represents the seating capacity and with the derived graph of average loading. It is this "average loading" which should determine the size of the car best suited for the line.

For instance, an examination of the upper graphs in Fig. 14 shows that the car should be a little larger to care for the worst condition or that more of the present type should be operated. By making similar studies for say a dozen points (as indicated in Figs. 15 and 16) we can decide definitely what is the best car for the line as a whole, while for the congested sections we can arrange shorter headways through turn-backs or trippers.

Again, we may look at the question in another way: Will the combined effects of increased rates of acceleration and braking, shorter length of stops, fewer stops per mile, etc., be of sufficient importance to give a shorter headway with the same number and size of cars now in use? We must not ignore the probability that shorter headways will bring more gross revenue.

Such studies as these should be considered in connection with the analysis of line travel by zones as detailed in the following paragraphs.

Study Traffic by Zones

Both in securing general data on a line and the making of schedules it is best to divide the line into zones. In the downtown districts the travel is congested and stops frequent, so the running time must necessarily be relatively slow. As we leave the center of the city, stops are less frequent and vehicle and pedestrian interference greatly reduced; therefore the schedule speed is much higher. When we also consider the possible turn-back points, we are ready to lay out the following data:

1—Distance					
2—	Running Time	Stops	Length of Stop	Schedule Speed	Average Voltage
A.M. rush.....	.....	.....	.....	.....	.....
A.M. non-rush.....	.....	.....	.....	.....	.....
Noon rush.....	.....	.....	.....	.....	.....
P.M. rush.....	.....	.....	.....	.....	.....
P.M. non-rush.....	.....	.....	.....	.....	.....
Evening.....	.....	.....	.....	.....	.....
Night.....	.....	.....	.....	.....	.....
3—Curves and grade condition					
4—Special traffic conditions					

When we have these data (see Fig. 17) plus the schedule possibility of each car, we know if we are getting all out of our equipment that is advisable, mak-

ing due allowance against a schedule that is "too tight" to keep the men ambitious to hold the cars to time. The stops given in Fig. 17 are equivalent stops, and include slowdowns.

At any rate, we are now armed with definite information and can take up intelligently such problems as municipal traffic rules to secure the street car a right-of-way that will increase the schedule speeds so that it will not be necessary for the crew to take chances in meeting tight schedules.

Or to take a less obvious condition: Exact knowledge of the voltage in each of the zones will show if the bonding is right or if there is enough feeder in the

Table I—Schedule Speed Efficiency as Affected by Voltage

Stops per Mile	400-Volt Schedule		500-Volt Schedule		600-Volt Schedule	
	M.P.H.	Per Cent	M.P.H.	Per Cent	M.P.H.	Per Cent
3	12.4	79	14.2	90.5	15.7	100
5	11.0	84	12.2	93.2	13.1	100
7	9.9	86.6	10.75	94.3	11.4	100
9	9.1	91	9.6	96.0	10.0	100

Calculated on basis of tangent level track and without leeway.

section observed. For example, Fig. 18 shows how radically the schedule speed or mileage output of a car is affected over a range of 400 to 600 volts. What this low voltage means can therefore be calculated directly in dollars and cents so that it is easy to determine whether it will pay to buy better bonds, use automatic substations, install more feeder copper or to take any other measures that will improve the quality of service while lowering the cost of service.

From Fig. 18, just mentioned, Table I has been prepared to show the schedule possibilities with a 20-ton car at 400, 500 and 600 volts.

* * *

A Statistical and Schedule Department of Value

Statistical and Schedule Functions Should Naturally Be Placed Under a Transportation Engineer—The Service Fundamentals

WHAT has already been said about the essential records required by an electric railway indicates the need for a statistical department. Preferably this bureau should be combined with the schedule department because most of its work bears so directly upon transportation problems.

The work should be guided by an experienced transportation engineer who would have the tact to co-operate with all of the other departments and who would also have the ability to analyze every function of operation. To make a success of this department, it is also necessary to have its findings presented to the chief executive in such a way as to make its studies of practical instead of theoretical value.

This would be the department to prepare all the graphs mentioned in the different portions of this study. The chief executive of a railway may lack the time for details, but it is his duty thoroughly to review all of the phases of the work of this department, to keep in touch with the transportation engineer and to

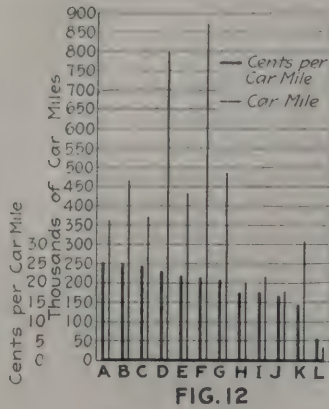


FIG. 12

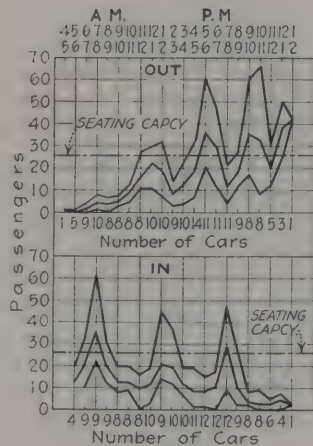


FIG. 14

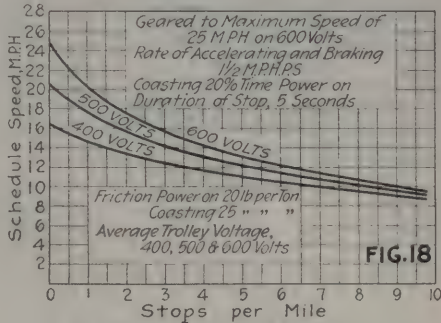


FIG. 18

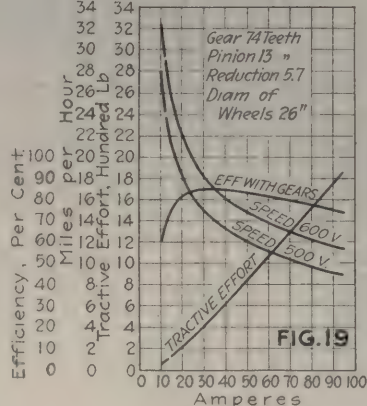


FIG. 19

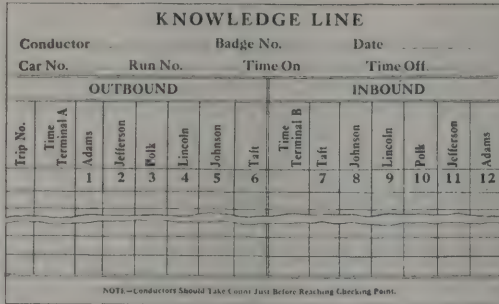


FIG. 13

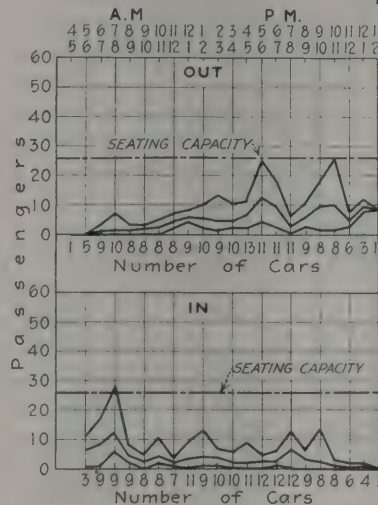


FIG. 16

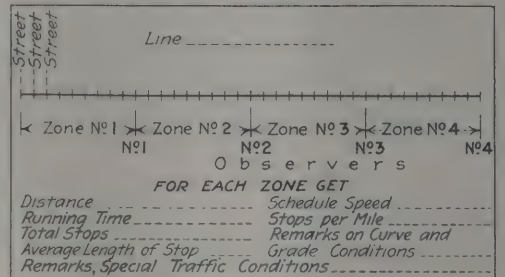


FIG. 17

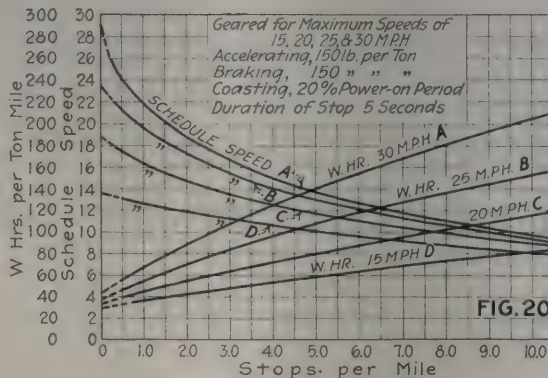


FIG. 20

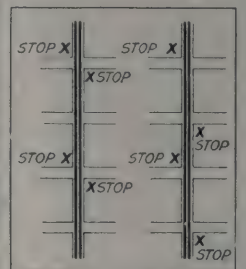


FIG. 23

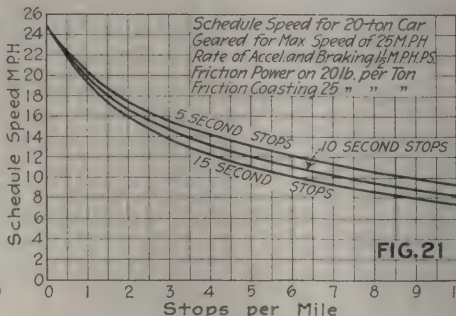


FIG. 21

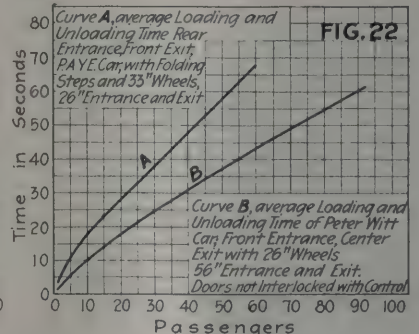


FIG. 22

GRAPHICS OF ELECTRIC RAILWAY TRANSPORTATION—PLATE II

- Fig. 12—Gross Earnings Per Car-mile

Fig. 13—Blank Form for Traffic Count

Fig. 14—Determining Car Loading

Fig. 15—Determining Car Loading

Fig. 16—Determining Car Loading

Fig. 17—Layout for Traffic Study by Zones

Fig. 18—Schedule Speed Curves for 20-ton Car
- Fig. 19—Characteristic Curves GE-25S Motor, Gear Ratio 13:74

Fig. 20—Schedule Speed and Energy Curves for 20-ton Car

Fig. 21—Influence of Length of Stop on Schedule Speed

Fig. 22—Loading Time Curves for Two Types of Car

Fig. 23—Comparison of Skip Stop (Left) and Stagger Stop (Right)

transmit to him such directions as are necessary to develop the usefulness of the statistical and schedule studies.

A truly scientific schedule department will solve many problems that cannot well be handled directly by the operating department. For example, there is the problem of determining whether it is desirable to have four different running speeds a day; and if so, what are the most economical figures, the question of balancing platform cost against power voltage, and others.

Or if it is a problem of removing an obstacle not within the control of the railway, such as vehicular and automobile congestion, better results will be obtained by publishing charts of surveys and detail reports of the delays so caused to the riding public than any amount of recrimination without evidence. If parking and safety zone ordinances are wanted, let this department prove the necessity for them.

In the past it has been too often the practice to lay out schedules on what might be termed the "cut and try" method. By this is meant that a trial car is operated over the line, usually under the supervision of some competent man, and the running time so made generally determines the future schedule.

On the other hand, every individual type of car has a certain schedule possibility which is almost entirely determined by the free running speed of the equipment, the arrangement of passenger interchange and fare collection facilities. The free running speed of each car being known and the other conditions outlined in the present study being reviewed, schedules can be calculated, based on what each type of car is actually capable of performing. Schedules prepared on such a basis should prove more satisfactory than those established by guess, although they should, of course, be carefully checked by actual trial as formerly.

To facilitate the making up of schedules on this basis, two graphs, Figs. 25 and 26, will be discussed later in this study; one for a 20-ton car and one for a 7½-ton car. These graphs give the schedule speeds which are possible with an equipment geared for any free running speed within certain limits. It is appreciated that the voltage will change the free running speed. The average voltage can be obtained by observation and due allowance made in the free running speed. With but a very small commercial error, free running speeds of all cars decrease in proportion to the voltage, as outlined later.

We may now proceed to a study of the service fundamentals of Safety, Comfort, Speed, Stops, Weight and Costs.



Higher voltage means higher schedule speed.

The First Service Fundamental Is Safety

Faster Schedules Are Not Incompatible with Greater Safety as the Maximum Running Time May Be Even Lower Than Before

ALL of our modern education has been along the lines of safety, not only with regard to the passenger and pedestrian but also to the railway employee. Since this subject is a well-nigh universal topic we need not discuss it in detail.

Nevertheless it is well to point out that in our discussion of car speeds, for example, we do not advocate any practices that could possibly impair safety; but we firmly believe that higher schedule speed and greater safety are compatible in many cases. The air brake, for instance, not only cuts down accidents but raises schedule speed through its reduction of the braking interval. Again, the saving of time due to low steps, pneumatic door and step control, etc., also produces higher schedule speeds without raising and, even by lowering, the maximum running speed. This paradox is due to the fact that in frequent-stop service higher rates of acceleration and retardation are more important for schedule speed than a maximum running speed which is unattainable on the greater part of the run.

* * *

The Second Service Fundamental Is Comfort

Modern Heating, Lighting, Ventilation, Smooth Acceleration and Correct Seating Are All Factors in Comfort

THE comfort of the passenger is second only to his safety. Bare lamp lighting, non-regulated heating and monitor-sash entrances for drafts are giving way to the non-glaring fixture, the thermostat and the mechanical ventilator. What is most satisfactory, too, is that modernizing all of these features saves money in lamp renewals, energy consumption and car construction even if it should fail to add one extra fare to the revenues of the railway.

Still another factor in car comfort as well as accident prevention is that of smooth acceleration. It is not the rate of acceleration that makes for discomfort as much as it is the layout of resistor steps and the ignorance of the motorman. If the steps are correctly reset, half of the car troubles are over; and if automatic acceleration is adopted, all of these troubles are over.

* * *

The Third Service Fundamental Is Speed

How to Determine the Free Running Speed of a Car; Relation to Gear Ratio; Effect on Schedule Speed of Number and Time of Stops and of Rates of Acceleration and Braking

ONE of the most important things is to know the schedule possibility of every car which the company owns.

This is directly affected by the free running speed of the car, namely, the speed which a car will ultimately attain if the controller is at full "on" position and the car is running on tangent level track.

This speed can be raised or lowered by changing the gear ratio. This change affects directly the amount of energy used and so has certain practical limitations set by the horse-power capacity of the equipment. It is always safe to lower the free running speed of the car, assuming this to be advisable, but when the speed is raised it is well to consult the equipment manufacturer and give him all the operating conditions before making a change.

We will assume that we desire to find the full running speed of a car weighing 34,000 lb. complete with all equipment ready to roll. We will also assume the car has 6000 lb. of passengers, which gives a total load of 40,000 lb. We will also assume that this car is equipped with four 25-hp. motors having 74-tooth gear, 13-tooth pinion and 24-in. wheels, and that the average potential is 500 volts.

To determine the free running speed we first must take the complete weight (including the live load) and get the weight in tons per motor. Since the car weighs 40,000 lb., or 20 tons, and there are four motors, we have 5 tons per motor.

The resistance to the keeping of the car in motion is expressed in pounds torque or drawbar pull. It is generally accepted that for city cars this resistance amounts to 20 lb. per ton. This figure includes the rolling friction, windage and force necessary to keep the rotating parts in motion.

Since the car has a weight of 5 tons per motor, this total resistance per motor is 100 lb. By referring to the characteristic curve of the motor shown in Fig. 19 we first find 100 lb. on the torque curve, and then by reading up to the speed curve we find the car speed at 500 volts is 24 m.p.h. and at 600 volts 29 m.p.h. ,

It will be noted that the speed is increased in almost direct proportion to the increase or decrease in voltage. Theoretically there is some difference, but for practical purposes this difference can be neglected on the light motor loads which are obtained with free running speeds.

Stops
Affect
Schedule Speed

One of the basic factors in the railway business is the number of stops the car has to make. This factor directly affects the line capacity, numbers of cars for a given service, car-hours, power, maintenance of equipment, size of motors, etc. How many operators know the number of stops that are made on their different lines? How many of them are trying to reduce the number of stops to a minimum? This is one of the largest fields for saving that can be made in car operation to-day.

To know how many stops a car makes per mile is not an abstract engineering question of no vital importance to the operation of the property. Of course, a certain number of cars have to be on a line, but it is possible merely by a change in stops to make fewer cars give the same number of seat-miles. If there are but four cars on a line, the displacement of one car would demand a 25 per cent improvement in operation, which would hardly be attainable if the line is within striking distance of proper operation; but if there are six cars on the line, it is often possible either to give more service with the same number of cars or to give the same service with less cars by a better arrangement

of stops and shorter length of stops. Of course, the same percentage of saving would apply to lines with a larger number of cars.

If the service is such that there are nine stops per mile with an average length of stops of five seconds each, the values would be as given in Table II.

Table II—Relation of Free Running Speed to Power Cost, Nine Stops per Mile

M.P.H. Free Running Speed	Schedule Speed	Kilowatt-Hours per Car-Mile at the Car	Power Cost for 40,000 Lb. Car-Miles, 1½ Cents per Kilowatt-Hour at the Car	Per Cent
15	8.3	1.52	\$912.00	100
20	9.5	2.16	1,296.00	142
25	9.9	3.00	1,800.00	197
30	10.2	3.84	2,314.00	253

Stops Also
Influence
Costs

Cars in city service run 30,000 to 50,000 miles per annum. Therefore, 40,000 car-miles per annum is a fair average. To get an idea of what number of stops per mile means on a car geared for 25 m. p. h., free running speed, we can study Table III with considerable profit:

Table III—Relation Of Number Of Stops To Schedule Speed and Platform Wages

Stops per Mile	Length of Stop, Seconds	Schedule Speed, M.P.H.	Car-Hours	Platform Wages at 60 Cents per Hour	Per Cent
5	5	13.1	3053	\$2,014.98	100
7	5	11.4	3508	2,315.28	115
9	5	9.9	4040	2,666.40	132

Table III especially emphasizes the advantage of eliminating stops. It also brings out the effect on schedule speed of an increased number of stops and the consequent reduction in speed. The savings of the car-hours and power, the most definite figures which we have, are but part of the savings influenced by raising schedule speeds. For instance, if a car operates at an increased schedule speed, the carrying capacity and service of the line are increased in proportion thereto; or the surplus cars are available for use elsewhere.

A further analysis of these figures brings out some very interesting facts. Assuming that a car is geared for 25 m. p. h. free running speed and is in a service with five stops per mile, the car would then be capable of making a schedule speed of 13.1 m.p.h. If the stops are increased to seven per mile, this figure would be decreased to 11.4 m.p.h. If the stops are increased to nine per mile, the schedule speed will be further decreased to 9.9 m.p.h.

It will be noted that there is 10 per cent leeway in the item for platform wages. This 10 per cent will be carried through on all items where wages are specified hereafter. The reason for this is that the schedules which are specified in every place in this discussion are theoretical schedules. To make them practical it is necessary to add 10 per cent for interruptions in traffic, grades, curves and necessary layovers at the end of the line.

Shorter Stops
Mean Lower
Costs

The length of stop can also be decreased if passengers are urged both by posters and by word of mouth to board and leave the car as expeditiously as possible, while the conductor should be urged to be

prompt in giving signals to the motorman through push-buttons or otherwise. The value of decreasing the length of stop is strongly brought out by the following Table IV and Fig. 21:

Table IV—Effect of Length of Stop on Schedule Speed

Stops per Mile	Length of Stop	Schedule Speed	Car- Hours	Platform Wages	Per Cent
5	15	11.1	3603	\$2,377.98	118
5	10	12.0	3333	2,199.78	109
5	5	13.1	3053	2,014.98	100
7	15	9.35	4278	2,823.48	140
7	10	10.3	3883	2,562.78	127
7	5	11.4	3508	2,315.28	115
9	15	8.0	5000	3,300.00	164
9	10	8.85	4519	2,982.54	148
9	5	10.0	4000	2,640.00	131

The car on which these figures are based is geared for 25 m.p.h. free running speed. Further, to analyze just what this table means, it might be well to consider a car with fifty passengers. Of course, the entire fifty passengers would not get on the car at the outer terminal of the line, but would be taken on at different points along the route. However, it is fair to assume that out of the fifty passengers twenty-five would be the equivalent number which would be carried over the entire distance.

We will assume that we can reduce the average length of stop from nine seconds to five seconds, saving four seconds per stop. We will also assume the following schedule conditions:

Sixty minutes running time
9 m.p.h. schedule speed
Eight and five-tenths stops per mile

It will then be understood that we will have a total of seventy-six stops, and since the time which is saved is four seconds each we shall save 304 seconds or approximately five minutes for the entire run. Since there is an average of twenty-five people and the total time saved on the run is five minutes, the total time saved for all of the passengers will be five times twenty-five or 125 minutes.

It may seem to some that this is figuring down to a rather small point—merely the saving of five minutes on a single run, but as we follow along the argument we can readily appreciate what five minutes means to the entire community.



When you have signs like this or its equivalent, the position of the entrance on the car is a minor matter.

Saving the
Rider's
Time, Too

Previously we took the average mileage of city cars at approximately 40,000 car-miles per annum. For the sake of argument, we will assume that this car is in a service which averages eight stops per mile. We will also assume that we reduce the length of stop four seconds. This would give a total saving for the year of 1,280,000 seconds or 355½ hours. When we consider that the average passenger load of the car would be approximately twenty-five, it is realized that the accumulated time saved for these passengers represents 8887½ hours.

These arguments illustrate directly the value of a small thing in car transportation. By looking at Table IV—which shows the difference between making nine ten-second stops per mile with seven five-second stops per mile—we see that to operate 40,000 car-miles a car must necessarily be in service 4519 car-hours. This will give a total number of 112,975 accumulated passenger car-hours, while with seven stops per mile and five-second stops, the accumulated passenger-hours would be 87,700. The difference between these two values would be 25,275 passenger-hours. This would be the accumulated time saved by the passengers on each car. If the system operates 200 to 300 cars or more, one can easily realize how this saving for the community is a valuable public service aside from any saving to the railway.

Use
Stop Signs
Freely

To reduce the length of stop to a minimum, it is advisable to mark all car stops plainly so that both the passengers and train crew will know exactly where the car doors will open. A misunderstanding means the loss of one or two seconds per stop while the passengers are walking up to the car entrance. It is these seconds per stop that in the aggregate are so valuable to the community and to the railway.

If a city car averages 40,000 miles annually and makes six stops per mile, it will make 240,000 stops annually. The average length of stop in city service is seven seconds. If we arrange markings at corners so that passengers will know the exact point at which the car entrance will stop and if both train crews and passengers exercise care in the amount of time the car is stopped, we could shorten the average length of stop to five seconds, which is equivalent to a saving of two seconds per stop. For a single car this means a saving in car time of 480,000 seconds annually, or more than 133 1/3 hours.

If the average number of passengers on a car is twenty-five, the annual saving for the passengers in each car would be 333¾ hours, or, assuming that the average active portion of the day of each person is sixteen hours, this figure would then be equivalent to 208 1/3 days. If figured on a ten-hour day, this amounts to 333 1/3 days for the passengers on a car.

We have just seen how important decreased stopping time is to both the public and to the railway. The next step is to see how they can co-operate to get the benefit of a smaller number of stops.

Fifty-three
Weeks to
the Year!

When railway officials contemplate inaugurating such service, the number of possible stops and existing stops,

including the distances between them, should be tabulated and analyzed. The distance between the new, possible stops should approximate 600 ft.

The first question that will arise will be not the gain of 10 to 12 per cent in schedule speed, but what will the change do for the individual rider? What does five minutes saved per half trip mean to him? Now this amounts to ten minutes a day, and if we allow 300 working days, the total will be 3000 minutes or 50 hours or 6¼ business days of eight hours each—practically a fifty-third week to the year.

As it is not unreasonable to assume that the time of the average car rider is worth 20 cents an hour, the fifty hours saved by cutting the number of stops would have a commercial value of \$10 per annum, the equivalent of 200 five-cent rides! In other words, the time saved for the passenger may be greater in value than the receipts per annum per capita! On the basis of 30,000,000 car-miles per annum, one railway is saving \$200,000 a year.

As with any other innovation, the public and the regulatory officials should be fully apprised of the railway's plans and purposes, for the success of the fewer-stop service will depend largely upon how it is introduced. To begin with, it is generally recognized that this service should be operated only in the outer district beyond the normal walking zone, and that in the downtown section and at transfer points the cars should make all stops. The near-side stop should be made standard, as this is a great time saver.

Further, the new plan should be introduced in the spring or summer months so that the riders will have learned to appreciate its advantages in the saving of time and the increasing of comfort in riding before the few days of severe snowy weather show them the change in its one unfavorable light. The matter should be thoroughly explained beforehand to the public also, so that the people will understand that they are to be the beneficiaries as well as the railway companies.

Play-Fair
or Stagger
Skip Stop

One way of operating fewer-stop service is to stop on alternate corners; the other is to have outbound cars stop at one series of corners while inbound cars stop at the other series of corners. The latter method, or "stagger" stop, illustrated in Fig. 23, has the advantage of equalizing the walking done by all passengers, since the passenger who walks an extra block in the morning does not have to do so at night—and vice versa. The stagger stop has been successfully introduced at Cleveland, Detroit, Buffalo, Kansas City and Toledo, and is now being tried at Baltimore, Dallas, Cincinnati and Columbus.

To show that the stagger stop plus walking is quicker for the patron than haphazard stopping, Fig. 24 has been prepared. This shows the time required to walk distances up to 1000 ft. Of course, the distance between stops does not have to be traversed by every individual car user. The greatest distance which he will have to walk will be one-half of the distance between the possible car stops.

It is to be expected that when some stops are eliminated, a few people will appear before regulatory bodies to contend that it is a personal inconvenience for them to walk an additional square. Not only do such complainants fail to consider the benefit to the community

in general, but they also fail to appreciate their personal gain and convenience. As for the storekeeper who wants every car to stop in front of his emporium, the rule of the greatest good to the greatest number should be rigidly applied.

It may be interesting to add that in European cities, the spacing between stops ranges from 250 meters (820 ft.) up* and that the stop signs are placed regardless of crossings—a practice which is safer and more equitable than the use of corners.

Save Time in
Passenger
Interchange

One of the most important studies, especially on city railways, is the proper design of car entrances and exits. These studies should be made in conjunction with different systems of fare collection.

To be sure, the height of step, width of entrance and means of signaling from the conductor to the motor-man are features which have long been studied. Nevertheless, the variations in the designs of cars purchased by different railways plainly show that the underlying principles of correct design have not yet been properly outlined and universally accepted.

To make the conductor reach up or out to some remote point to pull a bell rope instead of pushing a button on a fare box pedestal seems a trifle; but for the combined stops on a run it surely involves the loss of enough fractions of a second to be exceedingly important. Very profitably could we enter into studies such as those outlined in Frank B. Gilbreth's book on "Motion Study." The number of useless motions that are made by the passenger and also by the conductor should receive careful study. Until this study is made and followed to a conclusion, we shall never have a car which is properly arranged.

In all probability, the ultimate city car will be so arranged that the natural inclination of the passenger will be to follow a series of movements that will result in reducing the length of stops to a minimum. Every railway should study each type of car which it is now operating to ascertain the number of passengers which can be loaded and unloaded within a given time. These graphs of passenger interchange will plainly show the time effect of the different heights of steps, different widths of entrances and different methods of fare collection. If investigations of this kind are carried out we can rest assured that a number of operating com-

*See Blake & Jackson's "Electric Railway Transportation," page 84.

Table V—Effect of Two Rates of Acceleration and Braking and Different Number of Stops on Power Costs and Platform Wages While Maintaining the Same Schedule Speed

Stops per Mile	Acceleration and Braking Rate	Schedule Speed	Power, Kilowatt-Hour per Car-Mile	Car-Hours for 40,000 Car-mile Operation	Platform Wages per Hour Plus 10 per Cent	Power Cost at 1½ Cents per Kilowatt-Hour at the Car, 40,000 Car-Mile Operation	Total Cost	Per Cent
3	1½	15.6	1.84	2564	\$1692.24	\$1104.00	\$2796.24	106
3	2	15.6	1.56	2564	1692.24	936.00	2628.24	100
5	1½	13.1	2.28	3053	2014.98	1368.00	3382.98	128
5	2	13.1	1.90	3053	2014.98	1140.00	3154.98	120
7	1½	11.4	2.66	3508	2315.28	1596.00	3911.28	148
7	2	11.4	2.18	3508	2315.28	1308.00	3623.28	138
9	1½	9.9	3.00	4040	2666.40	1800.00	4466.40	170
9	2	9.9	2.36	4040	2666.40	1416.00	4082.40	155

panies would either dispose of some present equipment or change the entrance, exit and step arrangements to such advantage that a very handsome interest would be returned on the expenditure.

The great importance of the system of fare collection on loading time is shown in Fig. 22, which brings out the greater passenger-interchange speed of the pay-as-you-pass car over a prepayment car in exactly the same service. Thus the pay-as-you-pass car interchanged sixty on or off passengers in forty-three seconds, while the other car required sixty-eight seconds, or twenty-five seconds more!

Accelerate Quickly
Brake Quickly

For a long time we have realized that by accelerating and braking at relatively rapid rates we could make faster schedule speeds. To what extent this would affect the schedule speed has not, in so far as the writer knows, been previously worked out. The Twin City Rapid Transit Company has for years been accelerating its cars at a rate of 2 m.p.h.p.s. and also braking at rates which were as fast as was consistent with good practice. Within the last few years the Chicago Surface Lines have done likewise.

To show definitely what can be secured from schedules with different rates of acceleration and braking, three sets of graphs have been made up. Fig. 25 shows a 40,000-lb. car complete with load and geared for a free running speed of 25 m.p.h., assuming a definite length of stop of five seconds. The calculations are made on the basis of accelerating and braking at 1, 1½, 2 and 2½ m.p.h.p.s. With an equipment on cars of this weight the best rate of acceleration which we have been able to obtain commercially is 2 m.p.h.p.s. However, since the future may give us an equipment and car construction which will enable us to accelerate at 2½ m.p.h.p.s. we have included this figure.

On the automatic safety car, Fig. 26, data have been prepared for a car which will weigh complete with live load 7½ tons or 15,000 lb. The rates of acceleration and braking specified for this car are 1½, 2 and 2½ m.p.h.p.s. This car is also geared for 25 m.p.h. free running speed, and we are assuming that the stops are of the same length as for the larger car, that is five seconds. On these two graphs we have taken the example of a car accelerating and braking at different rates and have taken full advantage of all the schedule possibilities of the equipment when accelerating and braking at 1½ m.p.h.p.s. It will be noticed that the power increases with the more rapid rate of acceleration, but that we secure a greater schedule speed.

Another condition which we can consider is that illustrated in Fig. 27. This graph shows the maximum speed which can be obtained by accelerating and braking at 1½ m.p.h.p.s. The power when this acceleration is in use is shown in the upper graph.

We all know that by accelerating and braking at 2 m.p.h.p.s. rather than 1½ m.p.h.p.s. there is a considerable saving in energy consumption, providing the same schedule is maintained in both cases. This fact is brought out by Figs. 28 and 29, which show the power saving which can be made by accelerating and braking at different rates, while maintaining the same schedule. These two graphs are made for cars operating in runs of 1000 ft. each.

Fig. 27 shows the saving which can be made in energy

by operating a maximum schedule with 1½ m.p.h.p.s. acceleration and braking; and also the energy which will be used providing this acceleration and braking are changed to 2 m.p.h.p.s. With this latter condition we will still maintain the maximum schedule possible with the lower rate of acceleration and braking.

Higher Speeds Save

In order that we may analyze more thoroughly just what different rates of acceleration and braking mean, Table V has been prepared from Fig. 27, showing the effect of accelerating at 1½ and 2 m.p.h.p.s. for 40,000 car-miles. In this table we have merely considered the cost of power and platform wages. It will be noticed that we have taken three stops per mile with 2 m.p.h.p.s. accelerating and braking as a basis of comparison, using this figure as 100 per cent. By accelerating and braking at 1½ m.p.h.p.s. with three stops per mile we notice that the percentage expense for energy and wages alone has increased to 106 per cent. With seven stops per mile this is increased from 138 to 148 per cent and with nine stops per mile from 155 to 170 per cent.

In Fig. 25 we considered the 40,000-lb. car in service of three, five, seven and nine stops per mile and used rates of acceleration and braking of 1, 1½, 2 and 2½ m.p.h.p.s. We also took three stops per mile with 2½ m.p.h.p.s. acceleration and braking as 100 per cent. It will be noticed from Table VI that with three stops per mile the total cost of platform wages and power has

Table VI—Effect of Three Rates of Acceleration and Braking and Different Number of Stops on Power Costs, Platform Wages and Schedule Speeds, 40,000-Lb. Car

Stops per Mile	Acceleration and Braking Rate	Schedule Speed	Power, Kilowatt-Hour per Car-Mile	Car-Hours for 40,000 Car-Mile Operation	Platform Wages 60 Cents per Hour plus 10 per Cent	Power Cost at 1½ Cents Kilowatt-Hour at the Car, 40,000 Car-Mile Operation	Total Cost	Per Cent
3	1	14.3	1.80	2797	\$1827.54	\$1080.00	\$2907.54	108
3	1½	15.6	1.84	2564	1692.24	1104.00	2796.24	103
3	2	16.4	1.86	2439	1609.74	1116.00	2725.74	102
5	2½	16.9	1.89	2366	1561.56	1134.00	2695.56	100
7	1	11.6	2.20	3448	2275.68	1320.00	3595.68	133
7	1½	13.1	2.28	3053	2014.98	1368.00	3382.98	126
7	2	13.9	2.34	2877	1898.82	1404.00	3302.82	123
9	2½	14.4	2.38	2777	1832.82	1438.00	3270.82	122
11	1	9.95	2.52	4020	2653.20	1512.00	4165.20	155
11	1½	11.4	2.66	3508	2315.28	1596.00	3911.28	145
11	2	12.2	2.75	3278	2163.48	1650.00	3813.48	141
13	2½	12.8	2.80	3123	2061.18	1680.00	3741.18	139
15	1	8.75	2.80	4571	3016.86	1680.00	4696.86	174
15	1½	9.9	3.00	4040	2666.40	1800.00	4466.40	166
15	2	10.9	3.10	3669	2421.54	1860.00	4281.54	159
17	2½	11.6	3.18	3448	2275.68	1908.00	4183.68	155

advanced with 2, 1½ and 1 m.p.h.p.s. from 100 up to 102, 103 and 108 per cent respectively. With seven stops per mile the percentage is increased from 139 up to 155 per cent, and with nine stops per mile from 155 up to 174 per cent.

In like manner Table VII shows what can be done with a lightweight safety car at three different rates of acceleration and braking and four different numbers of stops.

The annual cost is estimated to be \$832.44, or 62 per cent, more at 2½ m.p.h.p.s. and three stops per mile than at 1½ m.p.h.p.s. and nine stops per mile.

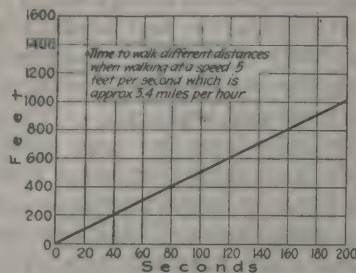


FIG. 24

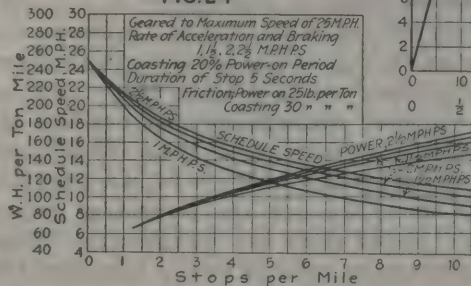


FIG. 25

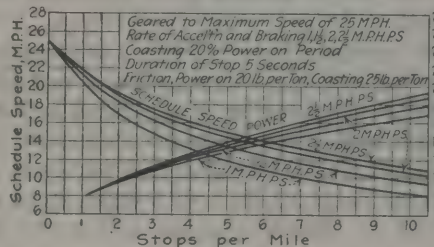


FIG. 26

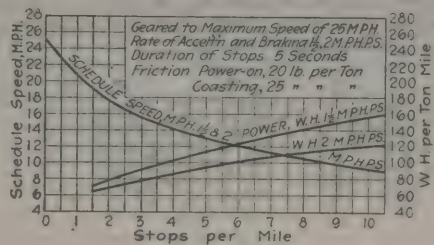


FIG. 27

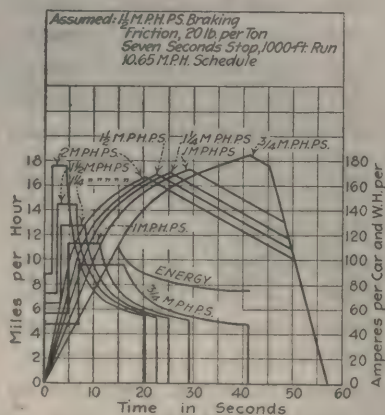


FIG. 28

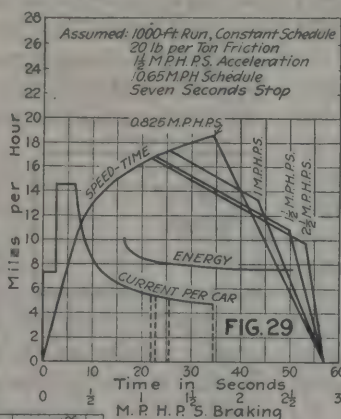


FIG. 29

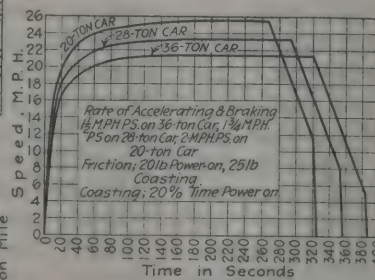


FIG. 30

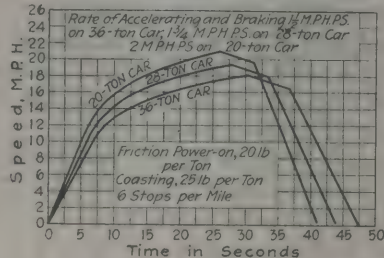


FIG. 31

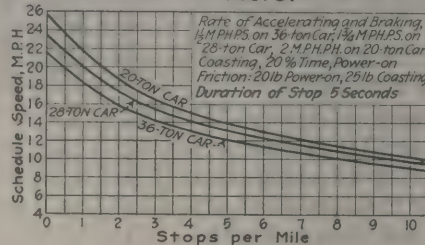


FIG. 32

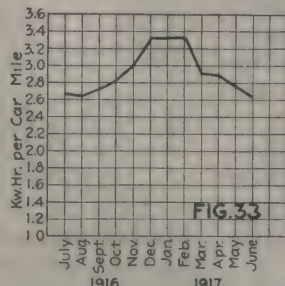


FIG. 33

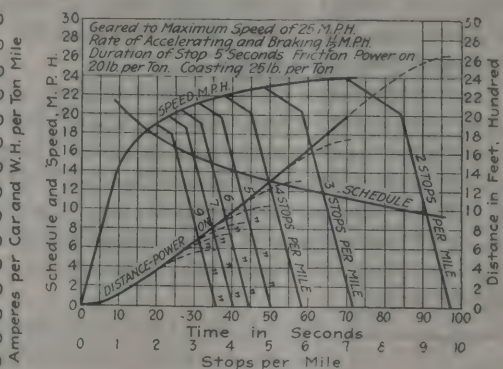


FIG. 34

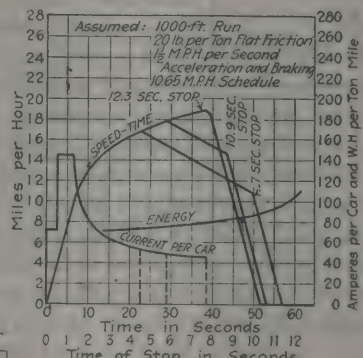


FIG. 35

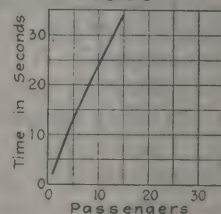


FIG. 36

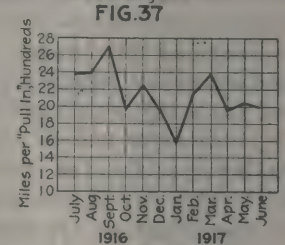


FIG. 37

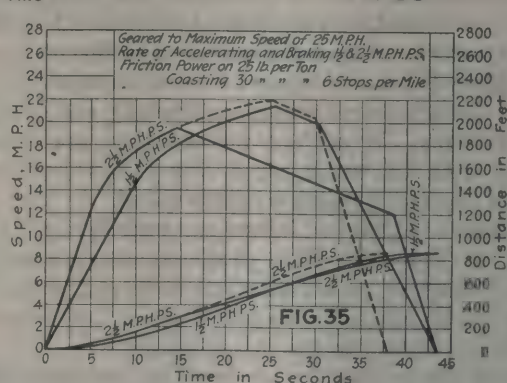


FIG. 38

GRAPHICS OF ELECTRIC RAILWAY TRANSPORTATION—PLATE III

- Fig. 24—Relation of Walking Distance and Time
 Fig. 25—Schedule Speed and Energy Consumption Curves for 20-ton Car
 Fig. 26—Schedule Speed and Energy Consumption Curves for 7 1/2-ton Car
 Fig. 27—Schedule Speed and Energy Consumption Curves for 20-ton Car
 Fig. 28—Chart Showing Decrease in Energy as Rate of Acceleration is Increased
 Fig. 29—Chart Showing Decrease in Energy as Rate of Braking is Increased
 Fig. 30—Speed-Time Graphs for 20-ton, 28-ton and 36-ton Cars

- Fig. 31—Speed-Time Graphs for 20-ton, 28-ton and 36-ton Cars
 Fig. 32—Schedule Speed Curves for 20-ton, 28-ton and 36-ton Cars
 Fig. 33—Graph Showing Effect of Heating on Energy Consumption
 Fig. 34—Speed, Schedule Speed and Distance Graphs for 20-ton Car
 Fig. 35—Speed and Distance Graphs for 7 1/2-ton Car
 Fig. 36—Chart Showing Increase in Energy Consumption as Duration of Drop Is Increased
 Fig. 37—Loading Time of Port Worth Safety Car
 Fig. 38—Graph of Miles per "Pull In" (Total "Pull Ins")

Table VII—Effect of Three Rates of Acceleration and Different Number of Stops on Power Costs, Platform Wages and Schedule Speeds, 15,000-Lb. Safety Car

Stops per Mile	Rate of Acceleration	Schedule Speed	Power Consumption per Car-Mile	Car-Hours for 40,000 Car-Mile Operation	Platform Wages at 36 Cents per Hour Plus 10 per Cent	Power Cost 40,000 Car-Mile Operation	Total	Per Cent
3	1½	15.4	.825	2597	\$934.92	\$495.00	\$1429.92	107
■	2	17	.84	2353	847.08	504.00	1351.08	101
■	2½	17.45	.85	2292	825.12	510.00	1335.12	100
■	1½	13.45	.915	2974	1070.64	549.00	1619.64	121
■	2	14.4	.945	2777	999.72	567.00	1566.72	117
■	2½	15	.96	2666	959.76	576.00	1535.76	115
7	1½	11.6	1.08	3448	1241.28	648.00	1889.28	141
■	2	12.65	1.18	3161	1138.96	708.00	1846.96	139
■	2½	13.2	1.23	3030	1090.80	748.00	1838.80	138
9	1½	10.2	1.26	3921	1411.56	756.00	2167.56	162
■	2	11.2	1.32	3571	1285.56	792.00	2077.56	155
■	2½	11.8	1.35	3389	1220.04	810.00	2030.04	152

These savings, of course, cannot be obtained in their entirety. We all know that there are certain operating conditions which have to be considered in connection with any calculated savings. However, it is fair to assume that by explaining these different features to all of the men, we can secure under favorable conditions at least half of these savings.

To determine what is the maximum rate at which a car can be accelerated, it is necessary to have the following data:

- Weight of car complete with live load.
- Number of motors per car.
- Size of motor, that is, hourly rating.
- Motor gearing.
- Size of wheel.
- Characteristic curve of the motor arranged for the proper size of wheel and gearing.

From these data it is possible to secure the amount of current which the equipment will require for different rates of acceleration. We will assume we have a car weighing 40,000 lb. and that the car is equipped with four 25-hp. motors having 74-tooth gear and 13-tooth pinion and that the wheel diameter is 26 in. To calculate this, proceed as follows:

Since the car weighs 40,000 lb. or 20 tons complete with live load this will be equivalent to 5 tons per motor. Let us assume that we are desirous of knowing if the car can be accelerated at 2 m.p.h.p.s. To accelerate 1 ton at 1 m.p.h.p.s. 91.2 lb. tractive effort or drawbar pull is required. It is also customary to add approximately 7 per cent for the rotary effect of wheels, gears, axles and armatures, which will give a total of 98 lb. per ton. Therefore, to accelerate this mass at 2 m.p.h.p.s. this figure will have to be doubled, by which we obtain a figure of 196 lb. per ton merely to accelerate the mass. To this figure for tangent level track it will be necessary to add 20 lb. per ton friction, which is the figure ordinarily used for rolling friction, energy, etc. Hence we would have a cumulative value of 196 plus 20, or 216 lb. per ton. Multiplying this by five tons we find that we have a total of 1080 lb., or by referring to the characteristic curve, Fig. 19, we find that 61 amp. will be required to produce the desired torque which gives the desired rate of acceleration. The hourly commercial rating of this motor is 37 amp., and it will be noted that the 61 amp. represents a value of 165 per cent of the hourly rating. With this particular motor it will be satisfactory with the weight given to accelerate with the currents specified. In the old non-com-

mutating pole motors it is always safe to use accelerating currents up to the full one-hour rating of the motor, and on certain non-commutating motors we can use accelerating currents as high as with the newer type commutating pole motors where it is safe to accelerate up to 150 per cent of the hourly current rating. However, it is always best to consult with the motor manufacturer before accelerating with currents which are in excess of the hourly rating.

That the motorman may know positively what maximum rates of braking and acceleration are permissible, it is advisable to have a sign placed above the controller, which sign should state distinctly the time in seconds in which it is safe to accelerate up to full series and full parallel when operating on level track.

Before the inauguration of a campaign for the maximum rates of acceleration and braking, it is necessary to have the mechanical department set up the circuit-breakers to a point which will allow them to open only when actual overloads occur. If this is not done, the circuit-breaker may be set so low that it will blow continually during the normal operation of the car. The controllers and motors should also be overhauled and cleaned up. It is also important that the piston travel be of the proper length to secure the maximum braking effect.

After we have reviewed the tables which show the effect of different stops per mile with different rates of acceleration and different length of stop, we are bound to feel that we should do everything we can to eliminate all possible stops. We should not simply refer to the stops as "useless," but consider how they tend greatly to increase or decrease the schedule speeds.

An example of what can be accomplished and how popular is bound to be a reduction in the number of stops is strikingly illustrated in the service which is given in the New York subway between Forty-second Street and Fourteenth Street. At these two points there are island platforms from which it is possible to take either express or local trains; the express train having a running time between express stations of approximately two minutes less than the local. Passengers almost invariably use the express train between these two points regardless of whether there is ample seating room on the local train. Here is a case absolutely free from coercion which proves that passengers are willing to sacrifice a seat to avoid four stops, in order to save two minutes and enjoy the exhilaration of riding in a vehicle which is not continually accelerating and braking.

This is a point which we should study and try to follow through to a conclusion. If we do this we shall be in better position to guide our public relations. This illustration of the use of the express train leads us directly to the conclusion that fast schedules and fewer stops build up business.

If we assume that the railway has been permitted to put into effect the speed-raising improvements discussed, it can go a step further—provided it can get the money—namely, rearrange its gear ratios. An idea of the schedule speeds which can be made with cars geared for different free running speeds

Public Puts Speed Before Comfort

Proper Gear Ratio Important

may be obtained from Table II and Fig. 20. We have assumed that the car weight complete with all equipment and live load will total 40,000 lb. and that by substituting different gearing we can arrange the car to have free running speeds of 15, 20, 25 or 30 m.p.h. This car would then be capable of making the schedule speeds shown in Table VIII when operating in a service of seven stops per mile with an average of five seconds per stop:

Table VIII—Relation of Free Running Speed to Power Cost, Seven Stops per Mile

M.P.H. Free Running Speed	Schedule Speed*	Kilowatt-Hours per Car-Mile at the Car	Power Cost for 40,000-Lb. Car-Miles—1½ Cents per Kilowatt-Hours at the Car	Per Cent
15	9.2	1.36	\$816.00	100
20	10.3	1.84	1104.00	154
25	11.4	2.66	1596.00	223
30	11.7	3.32	1992.00	278

*Schedule speed in all tables are understood to be the maximum speeds obtainable, no allowance being made for curves, grades and traffic interruptions. Actual schedule speeds will be 10 per cent lower.

The Fourth Service Fundamental Is Weight

The Advance Made by the Car Builder in Weight Reduction Is But One Item; the Operation of Smaller But Faster Cars Is Still More Important

THE service fundamental of weight embraces the size of car or seating capacity and the design and structure of a comfortable vehicle capable of operating at a speed which will satisfactorily meet the conditions of traffic.

We need not enter here into the province of the car builder except to note how the evolution from rule-of-thumb methods to the days of stress diagrams has brought down the weight per seated passenger from 1500 lb. to 500 lb. or less, as in the safety car, thus making an enormous saving in the cost of the weight propelled. Recently, detailed investigation was made on a prosperous, well-managed property which had inherited certain equipments. It has in city service a number of cars which weigh approximately 60,000 lb. each. These cars seat forty-eight passengers (1250 lb. per seated passenger) and are geared for a speed which is higher than necessary. A new car, weighing only 40,000 lb. and seating fifty-eight (687 lb. per seated passenger) was purchased to give even better service than the present equipments at an annual power saving of more than \$1,500 per car.

Even before a railway decides upon new equipment, it will do well to review all the weights of existing types so as to select the extra heavy cars for trippers and exclude them, wherever possible, from any runs on which the maximum mileage is operated.

The following Table IX shows the comparative power costs for 15,000-lb., 40,000-lb. and 60,000-lb. cars, assuming schedule conditions to be alike, length of stop five seconds, rate of acceleration 1½ m.p.h.p.s. and the cost of energy 1½ cents per kilowatt-hour at the car.

But the problem is far broader than is expressed by those savings in weight which are due to the advances in car building, because we can make still greater savings in the ton-miles propelled by using smaller but

Table IX—Power Consumption and Power Costs for 15,000 Lb., 40,000-Lb. and 60,000-Lb. Cars with Power Costs of 1½ Cents per Kilowatt-Hour at the Car

Stops per Mile	15,000-Lb. Car Power, Kw.-hr. per Car-Mile at Car	40,000-Lb. Car Power, Kw.-hr. per Car-Mile at Car	60,000-Lb. Car Power, Kw.-hr. per Car-Mile at Car	Power Cost for 15,000-Lb. Car, 40,000-Car-Mile Operation	Power Cost, 40,000-Lb. Car, 40,000-Car-Mile Operation	Power Cost 60,000-Lb. Car, 40,000-Car-Mile Operation
3	.825	1.84	2.76	\$495.00	\$1,104.00	\$1,656.00
5	.915	2.28	3.42	549.00	1,368.00	2,052.00
7	1.08	2.66	3.99	648.00	1,596.00	2,394.00
■	1.26	3.00	4.50	756.00	1,800.00	2,700.00

faster cars. In other words, the capacity of the cars should be considered on the basis of how many people they can carry per hour and not on how many they can carry per trip.

The but recent realization of the principle that schedule speed is a vital factor of car capacity accounts largely for the popularity of the big pay-as-you-pass car and the small safety car.

One beauty of the small car is the fact that it is the car with the least idle or excess weight during the light hours of the day.

To help us review the influence of weight propelled on a particular motor on which the same gearing is used, graphs have been prepared to show the free running speed which determines the schedule possibilities with cars having a total weight of 20, 28 and 36 tons respectively.

Fig. 30 shows that the free running speed with the three different classes of equipment will be

20-ton car—25.6 m.p.h. free running speed
28-ton car—23.4 m.p.h. free running speed
36-ton car—21.4 m.p.h. free running speed

It will be noted that this graph has been made up to show three different runs which are of the same distance. However, the time of making the run varies with the different weights of cars.

By referring to Fig. 31 we see that the highest speeds which are attained when the car is making six stops per mile are as follows:

20-ton car—21.0 m.p.h. max running speed
28-ton car—19.4 m.p.h. max. running speed
26-ton car—18.1 m.p.h. max. running speed

The time required for each cycle of operation will be as follows:

20-ton—41.00 seconds
28-ton—44.00 seconds
36-ton—47.25 seconds

By referring to Fig. 32 on page 20 we find that the schedule speeds which can be operated without leeway are as follows:

Stops per mile..... 3 5 7 9
20-ton car..... 16.5 13.9 12.25 10.9
28-ton car..... 15.4 13.2 11.65 10.4
36-ton car..... 14.6 12.2 10.8 9.65

This is but one phase of the study of what weight means. Another phase is that every time excess weight is moved it is paid for in power. So we should keep weights down to the possible minimum and still retain safety and reasonable maintenance. If we desire to know the influence of weights of all different cars on the system which are in service, we can ascertain from characteristic curves what is the free running speed of each car which is in service. We can also follow up the service conditions as they actually are and obtain

the number of stops per mile with which the cars are operating. From these data, and also from the data which are given on the graphs of power consumption and schedule speed possibilities, we can determine to a surprising degree of accuracy the amount of power taken by the different cars on the system. Due allowance can be made for transmission, substations and line losses, and so we can figure out the total amount of power used by any combination of equipments.

Where the mileage operated by each car and also the service in which it is operated are given, relative comparisons can be made as to what different cars cost for power consumption. Our estimates for wear and tear on track by equipments of different weight are not definite, but approximate figures can be taken to enable the operator practically to determine just what heavy cars cost. By making a comparison of this kind, the operating department will learn what cars should be run for the maximum mileage and what cars should only be used as trippers.

* * *

The Fifth Service Fundamental Is Cost

The Elements of Both Time and Weight Enter, Aside From Which Energy Savings Are Possible Through Anti-Friction Equipment and Scientific Operation with Maximum Coasting

A NUMBER of factors which affect cost of power, such as number and time of stops, gear ratios, weights, etc., have already been discussed. The time elements, of course, also have considerable effect on platform costs.

Undoubtedly there is a great deal of loss through wasteful operation of electric heaters and motor-driven hot-air heaters. If thermostats and automatic switches were used, the car-heating peak shown in Fig. 33 would be reduced 25 to 33½ per cent. At the same time, the riders would be more comfortable, because of the more uniform temperature attained. Thirty per cent of the electric heaters ordered last year from one maker included thermostats.

Among the minor power losses are those due to dragging brakeshoes—a condition that can be eliminated partly by the use of air brakes, automatic slack adjusters and more coasting. The installation of these devices will require new capital, which the operating company may or may not be able to secure at a reasonable rate of interest.

**Coasting
Extremely
Important**

In addition to these factors is the overwhelmingly important one of the motorman's handling of the car operating cycle, namely acceleration, coasting, braking. Here are important opportunities if we

first learn how to analyze the possibilities for ourselves and then instruct the motormen with the aid of car checking instruments to operate exactly as they should.

Therefore, it will be of decided advantage to know just how many seconds are required for each particular part of the cycle of car operation. In order to facilitate our study Figs. 34 and 35 have been made up for the big and small cars respectively. Fig. 34 illustrates a car weighing 20 tons, which is geared for a maximum

free running speed of 25 m.p.h., when accelerating and braking at 1½ m.p.h.p.s. using 20 lb. per ton friction during the power-on period and 25 lb. per ton friction during the coasting period. Let us assume that this car is operating in a service with six stops per mile. Then the car will require 26.3 seconds to reach the point where the current is cut off and will have to traverse a distance of 580 ft. The time required to the end of the coasting will be 31.7 seconds and the distance will be 700 ft. The time required to the end of the braking, namely, when the car comes to a complete stop, will be 44.5 seconds and the distance traveled will be 880 ft. On the lower ordinate it will be noted that time and stops per mile are specified. The stops per mile refer to the schedule speed graph which is shown above and should not be confused with the distance graph or with the graphs which illustrate the actual car speed, coasting and braking.

Since the energy that can be saved during the run cycle depends largely upon the time available for coasting, it is not only desirable to use high rates of acceleration and braking, but also to shorten the length of stop. By referring to the graphs, Fig. 36, we see that by making a seven-second stop the coasting will amount to 120 per cent of the power-on period, while by extending the length of stop to 10.9 seconds, this figure is further reduced to 47.8 per cent; by further increasing the length of stop to 12.3 seconds, the coasting period is reduced to 2.63 per cent. It will therefore be readily appreciated that if we are operating a car at a given schedule, the length of stop is a big factor in the amount of coasting possible. We should, therefore, help the crews all we possibly can to take advantage of this phase of operation in addition to obtaining the permissible maximum rates of acceleration and braking.

The use of anti-friction bearings, particularly for the journals, naturally will extend the coasting period.

It may be added here that even on lines of three or four cars, where the larger economies (like saving a car) are impracticable it is at least possible to get more coasting, which means power savings.

* * *

The Cars of To-day

Why the Light-Weight One-Man Safety Car and the Pay-as-You-Pass Car Loom Up So Largely on the Electric Railway Horizon

FROM the car-loading graphs presented earlier in this article, we have seen how readily a small car meets the average car loading. When we give this small car 15 per cent greater schedule speed, or mobility, through the use of higher accelerating and braking rates and fewer stops, and then economically give a 25 to 50 per cent shorter headway, we shall find that the safety car can be run to good advantage on a large number of lines.

Table X has been prepared to show just what the safety car does under stated conditions for say a year's operation of 30,000 or 40,000 miles. By the use of this car with the fair average of seven stops per mile and five seconds per stop the cost of platform wages and power for 40,000 car-miles is estimated to be \$1,964.90. This figure is but 41½ per cent of the \$4,727.70 cost of

Table X—Possibilities of the Safety One-Man Car
40,000 CAR-MILES OPERATION

Stops per Mile	Length of Stop	Schedule Speed with 2 m.p.h. p.s. Acceleration and Braking	Kilowatt-Hours per Car-Mile 2 m.p.h.p.s. Acceleration and Braking	Car-Hours, 40,000 Car-Mile	Power Costs 1.5 Cents per Kilowatt-Hour at the Car	Platform Wages 36 Cents per Hour plus 10 per Cent	Total Wage and Power
3	5	17	.84	2353	\$504.00	\$931.78	\$1435.78
5	5	14.4	1.02	2777	612.00	1099.69	1711.69
7	5	12.6	1.18	3174	708.00	1256.90	1964.90
9	5	11.2	1.32	3571	792.00	1414.11	2206.11

30,000 CAR-MILES OPERATION

Stops per Mile	Length of Stop	Schedule Speed with 2 m.p.h. p.s. Acceleration and Braking	Kilowatt-Hours per Car-Mile 2 m.p.h.p.s. Acceleration and Braking	Car-Hours, 30,000 Car-Mile	Power Costs 1.5 Cents per Kilowatt-Hour at the Car	Platform Wages 36 Cents per Hour plus 10 per Cent	Total Wage and Power
3	5	17	.84	1764	378.00	698.54	1076.54
5	5	14.4	1.02	2083	459.00	794.86	1253.86
7	5	12.6	1.18	2381	531.00	942.87	1473.87
9	5	11.2	1.32	2878	594.00	1060.48	1654.48

a large two-man car in a service of nine stops per mile with ten seconds per stop.

Car Sizes Contrasted

From the traffic checks previously described, we can find the total number of passengers for cars for each hour of the day; also the total number of cars passing the checking point. With these data

we can readily calculate what the seating capacity and size of car should be. We can also see just what will be the effect of putting on a lesser number of large cars or a greater number of small cars.

Now the only limitation of the small car is the number of units that can be run through the congested por-



This is the originator of the safety car

tion of the city. The studies of B. J. Arnold in Chicago indicate that the least permissible time between following cars is approximately twenty seconds. But looking at the subject in a broader way, we can well afford to consider what other possible parallel avenues of travel could be utilized if necessary to give adequate service with economy.

Another fact to be considered is that in accordance with old-time viewpoints railways frequently have operated cars over certain streets and to special points because they feared to offend public opinion. To put this in another way: a few prominent citizens, to serve their own selfish mercantile interests, wisely or unwisely have dictated to the railway where cars should be operated. Their will prevailed, not because the greatest number of citizens were properly accommodated thereby but because these few citizens who thought they had something big at stake, possessed the largest, loudest and most persistent voice as regards the accommodations which the railways should provide for the public.

Recent events and conditions have accelerated the spread of the modern idea that all service, public and private, must be operated on the basis of the greatest

economy consistent with public policy. In short, we must consider first the good of the largest number.

For the purposes of comparison in costs, we have taken a 40,000-lb. car complete with load and 15,000-lb. car with load, as shown in Table XI. Let us first re-

Table XI—The Superiority of the Safety Car for a Given Service

	40,000-Lb. Car Seating Fifty-four	15,000-Lb. Car Seating Twenty-eight	15,000-Lb. Car Seating Twenty-eight
Length of line, miles.....	10.5	10.5	10.5
Interval between cars, non-rush, minutes.....	10	5	10
Interval between cars, rush, minutes.....	6.6	3.3	3.3
Cars required, non-rush.....	6	10	5
Cars required, rush.....	9	15	15
Stops per mile, non-rush.....	5	4	5
Stops per mile, rush.....	6	5	5
Average length of stop, seconds, non-rush.....	5	5	5
Average length of stop, seconds, rush.....	5	5	5
Running time, minutes, non-rush.....	57.5	45	48.5
Running time, minutes, rush.....	60	50	48.5
Schedule speed, miles per hour, non-rush.....	11	14	12.9
Schedule speed, miles per hour, rush.....	10.5	12.9	12.9
Rate of acceleration and braking, miles per hour per second.....	1½	2	2
Layover in minutes, non-rush.....	2½	5	1½
Layover in minutes, rush.....	0	1½	1½
Seats per hour, non-rush.....	324	336	168
Seats per hour, rush.....	486	504	504
Car-miles per day.....	1260	2510	1677
Car-hours per day with four hours, rush service.....	120	200	130
Crew wages per hour, cents.....	60	36	36
Total platform wages with four hours' rush service.....	\$72.00	\$72.00	\$46.80
Power cost per day.....	47.19	35.57	27.17
Combined wages and power per day.....	119.19	107.57	73.97
Combined wages and power per year, 330 days.....	\$39,172.70	\$35,498.10	\$24,310.10

view the cost of platform wages and power of the large car on a line with ten-minute non-rush and 6.6-minute rush service. By putting on the small car with higher schedule speed we can give twice the service at an estimated operating saving of \$3,674.60 per annum. In many cases this increase in service will produce 30 to 40 per cent more gross.

In each case studies should be made of the riding habits of possible customers to determine how many ride in automobiles, and we should also consider the class of people along the line to get an idea of what increased service is likely to do in changing the shopping habits of the community and other habits which are affected by transportation facilities.

Of course, our small units will operate more car-miles, but the cost of maintenance per unit is sufficiently low to make one grade of service cost practically about as much as the other.

The field of the small car yet remains to be determined, but on routes of light or moderate traffic where the rush-hour requirements are not so greatly in excess of those during the rest of the day as to impose an excessive penalty in the form of numerous tripper cars, the electric railway manager can well consider the possibility of this type of car.



Analyze car loading by hours and zones to decide the size of car

Make Every Car Make Good

Car-Mile Records Should Be Kept of All Equipment Defects and Their Influence on Service Analyzed. Every Railway Should Also Know the Use Factor of Its Equipment

THE number of cars taken from service every day because of equipment defects directly pictures the physical condition of the apparatus and, broadly speaking, usually represents the amount of money which is spent for equipment maintenance. Where there are a large number of failures the cost of maintenance is in proportion.

Records should be made of all crippled cars turned in by the transportation department; and it is advisable to transcribe this information into classified graphs which will show on the basis of car-miles per failure, the failures to motors, electrical equipment, car trucks, bodies and brakes respectively. On large, well-operated systems mileage per failure varies from 2800 to 4400 car-miles. By the proper segregation of these failures the mechanical department knows exactly what portion of the equipment is causing the largest number of troubles and can use its energies intelligently to care for each trouble as it comes along.

It is even more important to know just how many minutes delay certain defects caused in service on the line. With such a comparison, added to the mechanical analysis, it will not take long to learn what equipments are unprofitable and unsatisfactory.

What's Your Use Factor of Cars?

Perhaps the first thing to do is to determine the use factor of the cars, namely, the actual daily car-hours against the ideal car-hours obtained by multiplying the number of cars by twenty-four. At the very least, this will be good material for publicity; but going deeper, we see how this ratio is affected by the proportion of cars unsuitable for the season or just out of a job, the proportion in for inspection, for repairs and for painting. Take the last-named item for example. If a car is painted once a year, a week saved by quick-painting methods corresponds to 2 per cent of its working time.

The use factor, which varies between 30 per cent and 40 per cent, gives a definite idea of the number and consequent value of the extra cars required to give adequate rush-hour service. Interest, depreciation and upkeep of this extra equipment are parts of the cost of giving rush-hour service.

Car Failure Analysis

The superintendent of equipment should classify all failures of equipment for each class of cars carefully. The following list of headings will be found convenient in this connection:

Car Bodies

Car-body parts	Seats
Sash or glass	Doors and operating mechanism
Ventilators	Signs
Registers	Heaters
Gong signals	Headlights
Sand box	Light circuits
Drawbars	Window shades
Fenders	
Trapdoors	

Trucks

Wheels	Brake rods
Axles	Brake levers
Journal bearings	Bolster springs
Truck frame	Loose brakes
Brakeheads and shoes	Tight brakes

Electrical Equipment of Cars

Trolley base	Circuit-breaker
Trolley pole or wheel	Controller
Wiring	Grid resistance
Fuse box	

Motors

Field coils	Gears
Low bearings	Gear case
Armatures	Motor frame
Brush-holders	Motor leads
Pinions	

Air Brakes

Compressor	Engineers valve
Motor	Reservoir
Governor	Piping or brake cylinder
Air-brake parts frozen	

If this classification is followed for each series of cars, we can ascertain what particular cars and kinds of failures recur again and again. Under each of the five general headings, it is advisable to chart the car-miles per pull-in. Of course, there should always be graphs showing the effect of the total pull-ins. A glance at these charts, such as Figs. 38, 39 and 40, will show



We are indebted to this man for the pay-as-you-pass car

whether or not the mechanical department is maintaining the proper relations between failures and pull-ins.

Equipment failures are very expensive and unsatisfactory. Each car taken from service makes for serious public inconvenience and costs the railway much more in transportation losses and interruptions to service than for repairs to the car alone. Thus the book costs of replacing a defective coil may be only \$9 or \$10; but this takes no account of the cost of moving the dead car to and from the shops nor of the losses in revenue and payment for idle platform time on all of the cars delayed—not to mention the inconvenience to the public.

What we have said about the value of high rates of acceleration and braking will help to give a true appreciation of what it means to have equipments capable of meeting fully the requirements of an efficient transportation department. The maintenance cost of the equipment is but a small portion of the other expenses which may be incurred due to the failure of obsolete equipment to measure up to modern standards. It behooves the manager to investigate with particular care the merits of the higher acceleration four-motor equipment as compared with two-motor equipment. In fact, now that we understand better the dollars and cents value of higher rates of acceleration, we may expect the old controversy of four-motor versus two-motor equipment to be decided soon in favor of the former.

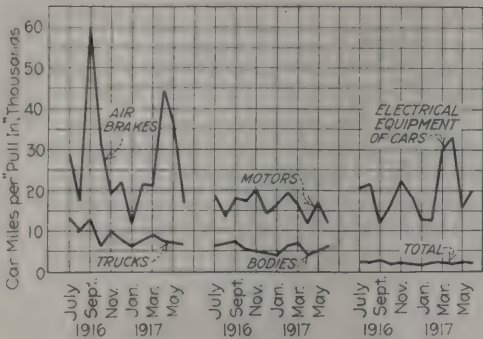


FIG. 39.

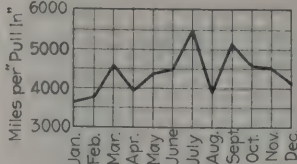


FIG. 40

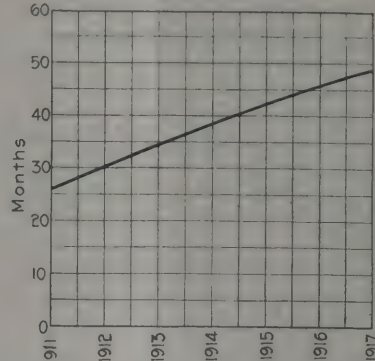


FIG 41

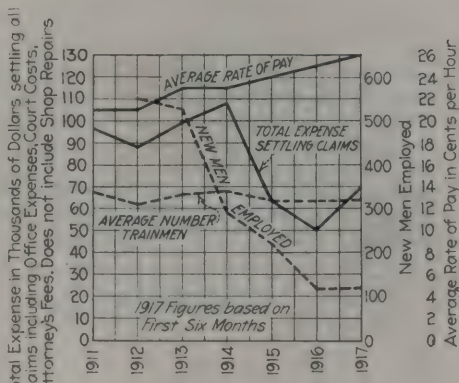


FIG. 42

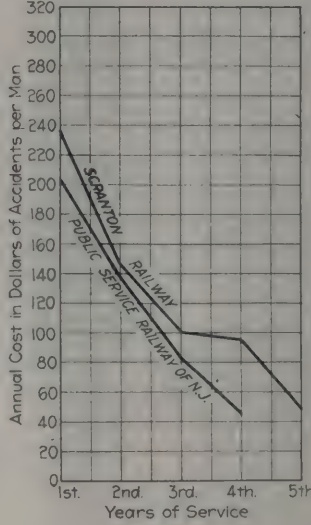


FIG. 43

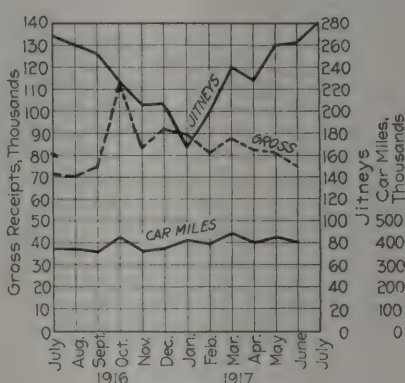


FIG. 44

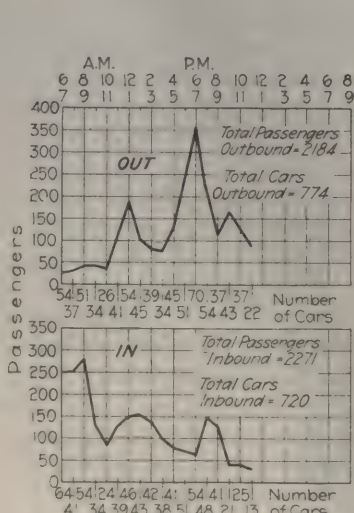


FIG. 45

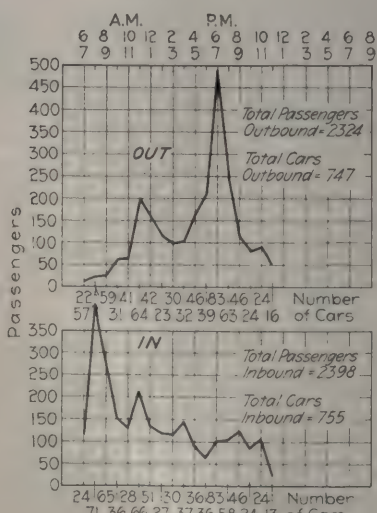


FIG. 46

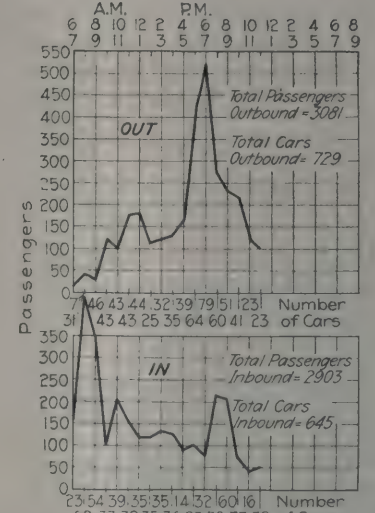


FIG. 47

GRAPHICS OF ELECTRIC RAILWAY TRANSPORTATION—PLATE IV

- Fig. 39—Car-miles per "Pull In," i.e., Cars Removed from Service Due to Car Defects
- Fig. 40—Car-miles per "Pull In"
- Fig. 41—Average Duration of Service of Trainmen, Dallas
- Fig. 42—Relation of New Men Employed and Cost of Settling Claims
- Fig. 43—Graphs Showing How Platform Experience Cuts Platform Cost
- Fig. 44—Graphs Showing Irregularity of Jitney Service and Regularity of Street Car Service, Town B, Excluding Suburbs
- Fig. 45—Jitney Check in Town B, on C Street at Corner of First Street
- Fig. 46—Jitney Check in Town B, on E Street at Corner of Tenth Street
- Fig. 47—Jitney Check in Town B, F Street, corner Fifth Street

Fare Boxes Will Get More Money

It's Not Only Good Policy to Waste Less But Also to Get Every Fare Possible

IN A REVIEW of the operations of a company recently it was found that the cars were operated without fare boxes. After investigation the management concluded if fare boxes were installed, there would be an increase of 5 per cent or \$100,000 in the gross receipts of the company, because with the present system of fare collection a large number of fares are lost either through indifference or dishonesty of passengers and conductors.

The psychological effect of having a fare box which every passenger must pass seems to be the one best way to get all the money due. The fact that a person passes the fare box means to both the person and the conductor that some fare must be put into it. If the fare is not deposited, not only the riders who try to slip by the box but others within earshot and eyeview are likely to have that fact called to their attention—a factor that helps greatly to deter theft.

Aside from its direct fare-collection value, the fare box also keeps the conductor in the proper place to give signals promptly and safely. Therefore the fare box is a logical part of our "safe speed" campaign for producing additional business. Since the conductor is at the door, he can supervise the entrance and exit of all passengers regardless of whether or not the car is empty or full. With hand-to-hand collection it is necessary for the conductor to go up in the car and depend at these times upon the passengers to inform him if the starting signal should be given or not. This is not only an element of delay but of danger also, because the passengers have not got the skill nor should they be given the responsibility to observe whether it is safe for the car to be started.

* * *

How Can We Keep Satisfactory Men Satisfied?

Real Instruction, Complete Publicity As to Costs and Earnings, Agreeable Working Conditions on the Car and Recognition of Efficiency and Experience Are Among the Ways to Do It

WHEN we have dug out every technical and analytical resource that can be applied within the organization, we still have the great, big human problem of relations with the employees who are expected to apply those resources. In short, the personal equation of management remains the greatest single factor.

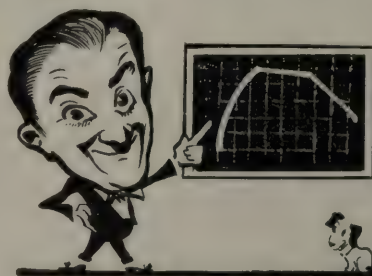
We ought to leave nothing undone to get the right kind of men; to instruct them in the right way without any concealment of motives; to make their jobs as pleasant as possible so they will feel like really enthusiastic salesmen; to use open inspection by "big brother" veterans who will say: "Haven't you overlooked a couple of fares, Jim?" and finally to make wages and bonuses rewards for honest service. Splendid results are being secured where the man at the top is in it heart and soul.

It is very important that the trainmen have the privilege of receiving correct instruction in every branch of their duty. More can be accomplished for

public relations by showing the employees how to handle the public than by any other means.

Technical Knowledge Necessary

To begin right, the instruction rooms should be well-lighted, well-ventilated and quiet, the newcomers being treated as guests. Great care should be taken in selecting an instructor. He should be a man who is thoroughly in sympathy with the management and who understands the fundamentals of the operation and running of equipment, having gathered his technical knowledge through experience and study. It should be his duty to inform the men how every portion of the equipment is made, and to confer with the mechanical and power departments at regular intervals to know what car-operating defects and wastage, respectively, are most frequent. He should be able to explain the benefits of proper rates of acceleration and braking, proper amounts of coasting, advantages of short length of stop, etc. Complete rule books should



A trainman instructor ought to know a speed-time curve and how to talk about it.

not only describe the apparatus used on the cars, but should also include a general description of what power and schedule savings mean to the company. If properly handled such instructions will greatly assist the management in the general campaigns of economy now so necessary.

Give the Men All the Facts

As to the general policy of the railway, if we do not convince our own employees that what we are doing is right, we certainly never can expect to convince the public. Inasmuch as each one of our employees is a salesman for the company, it will be necessary to have him thoroughly believe the doctrines which we preach. It will be necessary to make known to all the men all of the expenditures of the company in the simplest form so as to be readily understandable. If the company is losing money, the employees should know it so that they can make every effort to keep the company on a sound financial basis. If the company is making money they are equally entitled to the information. In these days when full financial reports are required by the authorities there would be little possibility of a company concealing information about its financial status, even if it desired to do so.

Experience Costs Less Than Accidents

The influence of rates of pay and considerate treatment of platform employees is strongly brought out by a study of the Dallas Railway under Richard Meriwether, now general manager. The attached graphs, Figs. 41 and 42, show how a voluntary increase in the average rate of pay from 21 cents to 26 cents an hour over a period of six years held the men.

Distribution of Conductors' Figures Obtained in Tra

Run Number	4-5		5-6		6-7		7-8		8-9		9-10		10-11		11-12		12-1		1-2		2-3	
	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In
18.....			2		5		5		1	10		5			2	9	4				5	23
5.....																						
17.....																						
10.....																						
15.....																						
12.....																						
14.....																						
11.....																						
4.....			5	7		6	8		7	7		5	1		9	9		13				
24.....																		5	1			
21.....			4		1	29	10															
17.....			14	0																		
20.....	11			14	71	31	8	1	6	1	13		4	1	7	8	14		6	6	5	5
1.....				20		48	10	15	6			22	4	1	7				6	5		
15.....			29			14		7	1		2	4		2	2	2			6	6	17	
7.....			2			11	3		3	11		10	5		5				6	6		7
6.....																						
13.....																						
3.....					40	12			8	2	11	5			1	5	5		5			8
2.....				7	70	30			19	3	12	10			3	3	14		5			
25.....																						
19.....	13		100	6	23	61	14		6			4	10		0	5		3	2			
9.....				24	18				2													
16.....																					5	5
Total.....	24		151	76	241	175	100	63	11	64	59	35	18	18	29	47		40	24	22	60	
Number of cars.....	2		7	7	8	8	7		5	8	6	7	5	4	7	7		7	5	7		
Average.....	12		21.5	10.85	30.2	21.9	12.5	9	2.2	8	5.5	9.8	5	3.6	4.5	4.1	6.7	6.3	5.7	4.8	4.4	8
Maximum.....	13		29	24	70	48	61	15	6	10	13	22	10	10	7	14	13	14	13	10	23	
Minimum.....	11		0	0	1		0	1	0	1	2	0	2	1	0	2	2	1	1	2	0	

In 1911 the average length of service of a trainman was twenty-six months, while in the first half of 1917 the average length of service had increased to forty-nine months.

The influence which the retention of the men in the service has to accidents is very striking. It will be noted that the total expense in settling claims for this property was reduced from approximately \$97,000 in 1911 down to approximately \$50,000 in 1916. The costs in each case are exclusive of the shop repairs and mileage losses due to shopping time.

Aside from the decreased cost of accidents we must consider the saving in instruction cost and apprenticeship periods.

Fig. 43, derived from Blake & Jackson's "Electric Railway Transportation," presents these figures on a year-by-year basis.

* * *

How About Automobile Competition?

The Sporadic Competition of the Jitney and the Continuous Competition of the Private Automobile Have Forced Us to Find Out Why People Do Ride or Don't Ride—Short-Headway, Fast Service, Accurate Time-Points the Only Solution.

AT THE very opening of this article it was said that the automobile manufacturers expected to get in use at one time 10,000,000 machines, or thrice the present number, before the saturation limit was reached—dour warning that unless electric railways revolutionize their ways in the right direction "the worst is yet to come."

In this journal it is unnecessary to rehearse the all-too-recent jitney history. Only one example of the effect of this competition will be quoted to show what records were kept as a basis for discovering the habits of the intruder, for determining the extent of the losses and for finding a remedy.

Although the jitney appeared in this particular city in 1914, there were still 268 jitneys in July, 1916, and by July, 1917, the number actually rose to 282. In the intervening months, however, as Fig. 44 shows, the number declined with the severity of the weather—only

167 being run in January. Now compare this ground and lofty tumbling with the almost uniform record of electric car-miles throughout the twelve months.

Isn't this a splendid exhibit of the dependability of electric railway service?

BULLETIN No. 300

NOTICE TO CONDUCTORS

February 14, 1917.

The company desires to make as close a traffic check as is possible. The object of this check is to ascertain the number of passengers in cars at definite fixed points on all lines. This information will assist us to determine if any improvement can be made in the service.

Each conductor will be furnished with a blank on which he is to note the number of passengers on his car at the different check points. Above each of the numbers a space has been left which can be filled in by the conductor to show the definite point at which the count is taken.

The following points on the different lines have been selected and numbered as the best points for the counts. We desire this count on all lines, both inbound and outbound.

Main Line—

- 1—Car house
- 2—3rd and Jones
- 3—5th, 6th and Williams
- 4—Union Depot
- 5—Cross Street

Spall Line—

- 1—8th and April
- 2—22nd Street
- 3—33rd and Washington

Waverly Line—

- 1—10th and Wood
- 2—24th and Waverly
- 3—26th and Abner

It is appreciated that there are certain times when it will be practically impossible for conductors to make an actual count of the passengers. At these times it is requested that the conductor use his own best judgment as to the number of passengers that are on the car, regardless of what the register reading is. It is the intention to have the figures as near right as is possible. Your cordial co-operation toward this end is requested.

Asst. Supt. Transportation

Survey at a Given Point—Baskerville Line, June 15, 1917

3-4		4-5		5-6		6-7		7-8		8-9		9-10		10-11		11-12		12-1		1-2		2-3		3-4		Car Number	Seating Capacity	
Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In	Out	In			
			14	13			10	11	12	13		1	2		0													
11	21	11	5		39		3	34		4	4		1	6	2	4			0							625	42	
79	0	20	25			6	8				0	34	1				1									628	"	
13	21		26			9	2						1													621	"	
3	9		3					4			5		4		0		1									626	"	
11	15		14			4		3			0				0		1									623	"	
				1				4						2	5												625	"
	23		17																							617	"	
	40		35																							624	"	
		63					1																			579	"	
																										507-660	"	
																										639	"	
																										577-597	"	
																										621	"	
																										628	"	
3																										627	"	
	15	9		11	3			11		1				5	0												626	"
																										624	"	
																										623	"	
																										622	"	
				11	2																					634	"	
																										582-655	"	
2		13	8				4	11				6	1		0				0							629	"	
																										627	"	
121	304	130	225	147	22	33	56	25	18	10	55	6	45	7	8	3	3	0										
7	0	0	9	8	4	10	7	5	5	0	0	5	4	6	3	4	1	2										
17.3	33.5	21.7	25	17.1	5.5	3.3	8	5	3.6	1.6	9.1	1.2	11.2	1.1	2.6	.7	3	0										
79	130	63	80	10	10	34	11	5	5	5	34	2	32	5	4	1	3	0										
	9	9	1	2	3	0	2	1	2	0	1	1	2	0	1	0	3	0										

The small initial investment in a jitney and the usual absence of all service obligations make it easy to withdraw individual machines from service; the large collective investment and fixed charges in an electric railway and the franchise requirements compel a large measure of service. Interest necessarily has to be paid on the investment, and every intelligent effort possible must be made to conserve that investment so that new capital may be obtained for new work.

Of course, those companies which tried to answer jitney competition by cutting down their own service made a tactical error. It was not necessary, however, to go to the other extreme of increasing the service at all hours of the day. If the jitney traffic had been plotted by hours, as in Figs. 45, 46 and 47, the extra service could have been put on only when it served the purpose of making competition unprofitable.

That the electric railway can win on this basis by the use of small, fast, one-man cars on short headways is now certain. The safety car in particular has proved that fact in a host of places. Electric railway men now know that the public isn't quite so prejudiced against them after all. What it really does is simply to take the first low-price transportation at hand—and if the street car is first, the street car gets the fare.

Private Autos
Are Tractable,
Too

The competition of the private automobile, naturally, is more subtle than of the jitney. Its severity also fluctuates with the weather, and it can be attacked directly only by zoning and parking restrictions. The latter are palliatives. As in the case of the jitney, the real deterrent is fast service with cars that the railway can afford to operate on short headways. Furthermore, exact operation to time-points will also help greatly—a feature which can be made effective automatically by the use of headway recorders, as at Fort Worth.

Accurately synchronized watches are a most decided factor in making time-point operation a success. Up-to date electric railways use watch movements equivalent to steam railroad standards. New speed, headway and time-point operation often will call also for the better relocation of many switches.

Experience in several cities indicates that with such standards the private automobile returns to its old limitations as a holiday car. Why bother to open and close the garage when the trolley car will start you on your trip downtown before you can get your automobile started?

This Car Card just issued is reproduced at the end of Mr. Layng's article because it illustrates the kind of co-operation which he describes.

THE Motorman and Conductor of this car are members of the U.S.FUEL ADMINISTRATION and they are pledged to save Electricity, which means COAL

WAR BOARD AMERICAN ELECTRIC RAILWAY ASSOCIATION.



The United States Fuel Administration, through the Electric Railway War Board, will furnish car cards like this to electric railways which will co-operate in the conservation movement by securing pledges from platform men to conserve energy.



PETER WITT CAR LOADING AND UNLOADING AT CLEVELAND DOCK TERMINAL OF ONE-CENT FARE LINE

How the Pay-As-You-Pass Car Was Developed

By PETER WITT

Formerly Street Railroad Commissioner of Cleveland

The Pay-As-You-Leave System, Introduced First in Cleveland, Prevented Boarding Delays, But Caused Congestion at Important Leaving Terminals—The Present Cleveland Car Cuts Down the Time of All Boarding and Alighting and Insures the Collection of All Fares—At the Same Time It Reduces the Work of the Conductor—The Peter Witt Car Is Also Well Adapted to the Zone System, Which the Author Considers the Best Solution for the Fare Problem

ON Jan. 1, 1912, by appointment, I became the city's street railroad commissioner, an office created under the ordinance then and now in effect for the operation of the property of the Cleveland Railway Company. By reason of the long drawn-out war (covering a period of ten years) the property not only was run down, but there was a lack of equipment, which produced during the rush hours a condition of crowding which can be described only by saying it was indecent. Bad as it was for the public to endure this kind of service, there was another phase not generally known to the car riders as a whole, and that was the inability of the conductors to collect all the fares due. The cars were all of the pay-enter type, and some had very large platforms. With a crowd of twenty-five or thirty riding on one of these platforms it became very easy, especially for the persons riding on the steps of the cars, to do their riding without paying fare.

Since new cars could not be ordered and delivered for many months, this condition called for the application of a speedy remedy, otherwise, the loss of fares, large as it was, would continue to grow as the news of the dishonest car riders was carried to the honest ones who were riding on the crowded platforms and still paying their fares. To give the full force of what I mean, let me quote a favored lecture of the late Albert Johnson to the conductors in his employ. He used to say:

"Don't steal, for if you are caught you will be fired, but I would rather have you steal a dollar than miss

one nickel. Why? Because every passenger up till the time that the conductor has failed to get his fare not only pays, but will make an effort to get the nickel to the conductor. But once you miss him and he has enjoyed the sensation of riding free he will be on the lookout to beat you ever afterward."

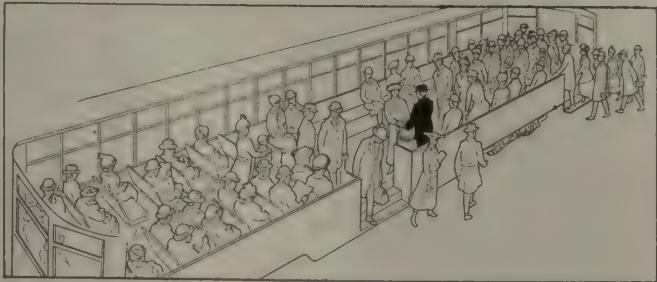
What was to be done? This soon gave way to, What can be done? Several weeks of earnest and hard thinking brought me to the place where I was convinced that to remedy the situation there was but one thing to do, and that was to operate the cars by reversing the time of payment, *i. e.*, changing from pay-enter to pay-leave. Not only would it be possible for the conductor to get all fares because car riders get off in ones, twos and threes, but there would be a swiftness of loading at terminals which would solve the old standing and everpressing problem of congestion. So in February I requested John J. Stanley, president of the Cleveland Railway, to rebuild one of the large platform cars by removing the forward bulkhead and changing from transverse to longitudinal seats on the devilstrip side. This change meant a wider aisle and the consequent reduction of the inconvenience of going through the car when the passengers entered at the front door and made their exit at the rear.

THE PAY-LEAVE PLAN WAS STARTED IN 1912.

The first car so reconstructed was put into service on April 10 following. Its success was immediate, but as it ran on a line which carried ninety pay-enter cars,

In-bound cars were delayed at the downtown terminal because of the large number of fares which had to be collected there. What was gained by loading by this method of fare collection was at once offset by unloading. One day's trial resulted in the making of a combination of the two systems of fare collection. When the car was being operated to the city we adopted the pay-enter plan, with entrance at the rear door, and when the car was out-bound, the pay-leave plan, with entrance at the front door. So successful did this change prove that all the other cars of this type, 100 in number, were speedily changed to this type of seating arrangement and alternation of fare collection.

In September of the same year the first of the 100 center entrance trailers, which had been ordered in January, were delivered and ready for service. Here was still another problem; cars without a platform. How to load them became the question. To use the method employed on the pay-enter platform cars meant confusion at the fare box, keeping the car riders out in the weather and the slowing down of the schedule. In order that the reader may get the full import of this



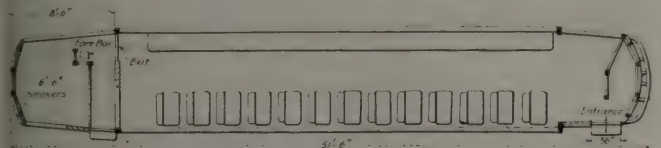
IN THIS VIEW THE ROOF HAS BEEN OMITTED TO SHOW HOW PEOPLE PAY THEIR FARES AS THEY PASS THE CONDUCTOR IN GOING FROM THE FRONT OF THE CAR TO THE REAR OR OUT AT THE EXIT

riders in Cleveland. We made all cars pay-leave when leaving the downtown loops. To all unacquainted with the street layout of Cleveland and who desire to grasp it quickly it might be likened to a three-quarter wheel, with the hub for the heart of the city and the spokes for the radiating streets. What through lines there were we cut and made the hub (the Public Square) the transfer point.

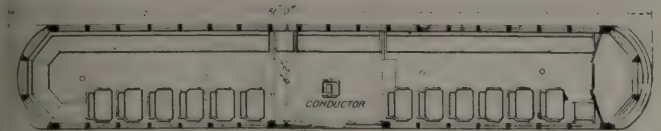
Under the former pay-enter system it was a nightly sight to see on all streets long lines of cars moving slowly toward the loop, because at the loop it used to take from two to three minutes to load a car. Under the new system these long lines disappeared, for a train now unloads and gets away in fifty seconds, in spite of the fact that a train covers more than 100 ft. of track, seats 127 passengers and has its complement of strap hangers. This method of operation was equal to doubling the terminal, which with us was impossible owing to an absence of streets.

THE PAY-PASS PRINCIPLE DEVELOPED FOR CROSSTOWN TRAFFIC

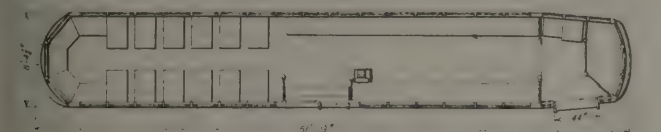
Now, in addition to the lines which radiate from the Public Square, we have five crosstown lines. The principal one of the five is the first one east of the Public Square, known as the East Fifty-fifth Line. This line, in a distance of three miles, crosses nine radial streets, over which run the cars of sixteen routes. On this line it is not unusual but ordinary for a car to discharge and take on anywhere from a score of riders from the



PLAN OF ORIGINAL PAY-LEAVE CAR IN CLEVELAND, PUT IN SERVICE IN APRIL, 1912



PLAN OF CENTER-ENTRANCE TRAIL CAR ON WHICH THE PAY-PASS SYSTEM WAS INTRODUCED, THE NEXT STEP IN THE DEVELOPMENT OF THE PETER WITT CAR



PLAN OF CAR DESIGNED BY PETER WITT FOR CROSSTOWN SERVICE IN CLEVELAND

let me say that the alternate stop had already been established in Cleveland, and this means that at such stops there accumulate all the car riders who under the old scheme are distributed at all street intersecting stops.

The solving of this problem, however, was easy. All we did was to regard the rear half of the car a loading platform, then make all car riders as they deposited their fares proceed to the forward end of the car. When the car reached the terminal all the conductor had to do was to open both doors. Then he need pay no attention to the front end, but simply watch the tickets drop from those in the rear. It was found that the non-paid, or rear, end of the car would empty just as fast as the paid end, for the rider in the rear end, having plenty of time, would have his ticket ready long before he would reach the box. Here was speed and convenience combined.

The next step was easy, as the pay-as-you-leave system was already in operation and familiar to the car

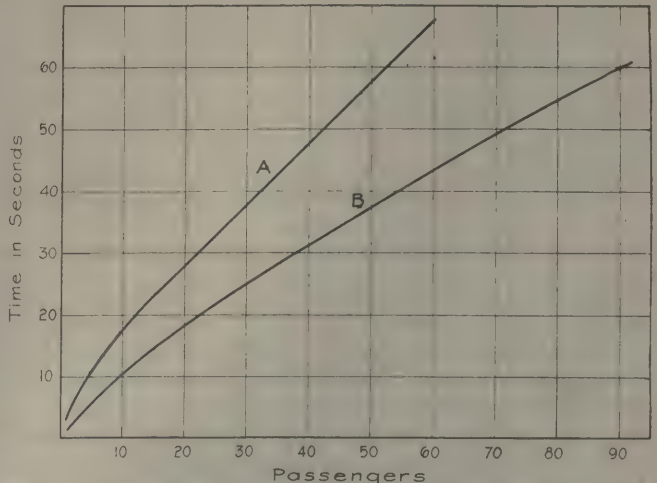


CHART OF LOADING AND UNLOADING TIME

Curve A—Average loading and unloading time of rear-entrance, front-exit, pay-as-you-enter car with folding steps, 33-in. wheels and 26-in. entrance and exit.
Curve B—Average loading and unloading time of Peter Witt car with front entrance, center exit, 26-in. wheels and 56-in. entrance and exit. Door not interlocked with control.

lightest of the radial lines to a full load at the heaviest ones. The need for a car to meet these most unusual transportation demands of this line called for a car having the advantages of both the pay-enter and pay-leave method and yet free from the shortcomings which both methods had developed, as already mentioned. The car had to be at once a front-end loader, and a quick loader, and it had also to be provided with a sure means of getting all the fares from the riders on a quick filling car. Knowledge of what was needed and the experience had with the first pay-leave car were of great help in solving this problem. The answer was the design which has since become known as the Peter Witt front-entrance center-exit car riders' car, the car with the pay-as-you-pass principle of fare collection.

As the entrance to this car is through the front door and the exit is by way of the center door, the movement

well. This means that in a very short while the man conductor will go. His place will be filled by a woman, partly because man labor is scarce but also because this is a woman's job. She will perform her duties more quickly than a man and also more neatly. At the same time the order and decorum will be better. Scrapping between the payer and the receiver of fares will be but a memory.

HOW THE PETER WITT CAR CAN BE USED WITH THE ZONE SYSTEM

The biggest thing for the car is yet to come, for the present method of charging a unit fare regardless of the length of haul must give way to the zone system. The rider who covers 9 blocks ought not to be obliged to pay the fare of the one who rides 9 miles. The street railway companies must become the equalizer between



THESE VIEWS SHOW DIFFERENT TYPES OF INTERIORS OF PETER WITT CARS, OPERATED ON THE PAY-AS-YOU-PASS SYSTEM

within the car is all one way, with the consequent absence of the confusion which comes from a conflicting movement. The doors are very wide, permitting the car riders to enter or leave two abreast. In the forward half of the car, which is really nothing more or less than a loading platform, longitudinal seats are used. This gives a very wide aisle and makes possible that rapidity of loading for which the design is particularly noted. It becomes a very easy matter for twenty or thirty people to board this car and to have the last one on before the first one arrives at the fare box. The paying then goes on while the car is in motion.

The rear half of the car is provided with transverse seats. As these seats are of the type which the public prefers, quite naturally they are the first to be occupied. The effect of this is to remove the car rider from the entrance, so the incoming crowd can move in without interference. There being no crush at the fare box, the collection of fares not only becomes easy but sure as

the short haul and long-distance rider. It must stop robbing the former, who now gets less than he pays for and refuses to stand for the larceny of the latter, who pays less than the service costs.

This change, which is bound to come, should receive more than serious consideration at this time, when the nickel is becoming less valuable every minute. It should be put into effect, for through it and it alone will come the remedy for the present-day transportation ills. It will even do more. It will easily prevent future ills, as come they will, to both owner and user of cars alike, for the stability of the nickel is gone. Its shrinkage hurts the former; its expansion injures the latter. Any change then needed to meet new conditions can easily be brought about by the simple and easy process of shortening or lengthening the zone. Such a plan of charging for rides is much less revolutionary than the present way of increasing the unit. The latter method kills the short and profitable haul

and fails to get what is due from the long haul. The zone system will save the short-distance rider to the transportation company and at the same time make the long-distance traveler pay the full price for the service he receives.

Right here the objector to the zone system will appear and give as his reason for opposition to the change that old hackneyed and threadbare argument that the present way is the only way of preventing congestion. But does it? Of course not, and it never will. Wherever you find the haul the longest then you will find congestion the greatest.

To him who refuses to take that answer as complete, let him look about. If he can show one extension that was ever made to relieve congestion which did not raise the value of land along the route traversed by the extension, he can show something no searcher has been able to find.

In Cleveland we carry people nine miles for three cents. Experience has shown that if the fare were six

I still have not disclosed the method of determining the cost or the scheme of fare collection when the zone system prevails. So here it is, not what is going to be, but what will be when the three Peter-Witt cars now building for the Mahoning & Shenango Railway Company are put into service.

This company operates a line from Warren to Low-ellville, Ohio, passing through five 5-cent zones. Passengers when they board will receive from the motor-man a check showing point of origin. When the passenger gets ready to leave he will proceed to the conductor, who, from the check, will know the amount due. Simple, isn't it?

The experience in Cleveland of low fares shows conclusively that the riding habit can be stimulated, and since the greater part of every railway company's equipment is dead for twenty-two out of every twenty-four hours, everything should be done which will bring this dead equipment into use. To me the easiest way to do this is through the zone system, with fares so low that walking will become costly.

A 1-CENT LINE IS RUN AT A PROFIT

Since the doubting ones will want more than my word for what I have said, let me cite briefly the story concerning the one-cent line in Cleveland by way of illustrating the wisdom of the zone system. This 1-cent line is a mile long and runs from the Public Square, where all our lines converge, to the Municipal Docks, where land the boats from Detroit and Buffalo. These boats arrive at 6 o'clock in the morning and in the summer months come heavily loaded. To take care of the throng, cars must be on hand. About one hour after the arrival of the boats the place is dead. There is very little occasion for anybody to go to the boat landing. At night the boat passengers commence making their way to the dock after 7 o'clock, for the Buffalo boat leaves about 9, and this movement continues until 11.45, when the Detroit boat departs.

From this it will readily be seen that the line running on a five-minute headway from 7 to 12 o'clock is over-serviced. Notwithstanding this and the big mileage cost of bringing these cars from the nearest operating station, which is five miles away, immediately after this line was put into operation it earned within 2 cents per car-mile of what was earned by the whole Cleveland system. Were these cars operating through two parts of the city where people desired to travel, I have no hesitancy in saying that the 1-cent line, instead of earning within 2 cents of the average of the system, would have earned many cents above it.

Coal Production Falls Off

Supplementing the diagram and table printed on page 1120 of the issue of the *ELECTRIC RAILWAY JOURNAL* for Dec. 22, the United States Geological Survey has issued a statement containing among others the following data: The average total bituminous coal mined per working day for the week ending Dec. 8 was 1,853,030 tons; for the week ending Dec. 15, 1,406,425 tons, and for the week ending Dec. 22, 1,652,858 tons. The total production for the week of Dec. 22 was 9,917,145 tons. The depression in the bituminous industry is accounted for by prolonged cold weather continued during the week of Dec. 22.



A PAY-AS-YOU-PASS CAR IN BUFFALO DURING THE RUSH HOUR ON A SNOWY AFTERNOON JUST BEFORE CHRISTMAS

cents just as many inhabitants would be living along this line, but with this difference: The land would sell for less, the decrease in the value of the lot would be measured by the increase in the fare. In other words, a high rate of fare means low land values in the suburbs, and a low rate of fare means high land values there. The owner of land at a distance from the center of a city capitalizes the industry and thrift of others. His is the game unbeatable and will remain so until the state appropriates for social purposes the social product—the unearned increment.

But I am off the track. What I started out to say was that when the zone system comes the front-entrance center-exit car will be the one for such measured service. Not that some other designs cannot be used, for they can, but not with the same degree of convenience to the car rider, whose welfare should always be uppermost in the minds of every street railway operator. He must learn what up to the present he has failed to understand—the car rider is a customer. Such being the case, what is the operator? Nothing more or less than a merchant. His occupation is that of merchandising rides.

New Electric Rolling Stock for 1917

Orders Placed for New Cars and Those Built in Companies' Shops During the Last Year Total 2455, Which Is a Marked Decrease from Figures for Each of the Last Ten Years—One-Man Cars Increasingly Popular

THE new rolling stock ordered during 1917 or built in the shops of the various electric railways of the United States and Canada and roads having electrified divisions is tabulated herewith. Although reports from all the companies were not received in time for compilation, the figures represent the railways having about 96 per cent of all the electric cars operated. The total of 2455 cars marks a return to the low figure of two years ago. The number of companies which reported new equipment is 182 as compared with 250 in 1916, which is proportionately less of a decrease than in the total number of cars.

The following table indicates the new rolling stock for the years since 1907, divided into city and interurban passenger cars and freight and miscellaneous equipment. In this summary cars for subway and elevated lines have been classed as city equipment and those for suburban or both city and interurban service have been placed in the interurban column. Freight and express cars, electric locomotives and work cars of all kinds have been grouped as miscellaneous cars. As heretofore, the number of city cars predominates, the figure for 1917 having been affected by a single order for 477 subway cars for the Interborough Rapid Transit Company.

Year	City Cars	Interurban Cars	Freight and Misc. Cars	Total
1907	3,483	1,327	1,406	6,216
1908	3,208	727	176	3,111
1909	2,537	1,245	1,175	4,957
1910	3,571	990	820	5,381
1911	2,884	621	605	4,015
1912	4,531	722	687	6,001
1913	3,820	547	1,147	5,514
1914	2,147	384	479	3,010
1915	2,072	336	374	2,782
1916	3,046	374	522	3,942
1917	1,998	185	272	2,455

An increase of nearly 50 per cent in the number of one-man cars purchased as compared with 1916 figures is a noteworthy feature of these data, the number of cars listed of this type being 280, besides thirty-three which were arranged for either one or two-man operation. The number of locomotives ordered was forty-nine, showing a decided increase over the numbers for 1916 and 1915, which were thirty-one and forty-three respectively. Cars of all kinds built in railway shops total 281, four companies contributing 176 of this number. The number of home-made cars is about two-thirds of that for 1916, which was a distinct advance over previous years. The use of interurban trailers continues to diminish, only twenty-seven cars of this type having been ordered, as opposed to seventy-one of a year ago. Trailers that may be considered for city service, however, number 402, while for 1916 the corresponding figure was 128. This difference is effected in part by 140 subway trailers for the Interborough Rapid Transit Company, which were included this year in the large order already referred to. No data were secured regarding orders for auto buses and motor trucks.

In the following alphabetical list space limitations have made it necessary to condense the data as much as possible. All cars are specified as either passenger or miscellaneous, the former including also combination passenger and baggage cars and the latter consisting of freight, express, service, work cars, etc. Locomotives are entered separately. In classifying passenger cars for city or interurban service, disposition was made here also as previously explained, and no attempt was made to classify the miscellaneous equipment with respect to service.

While in a canvass of this magnitude and one which must close on a definite date it is not possible to get reports from 100 per cent of the industry, every attempt has been made to present complete and accurate data. It has been possible in most cases to check the companies' figures against reports of the various car builders, and the courtesy of all who have co-operated in supplying statistics is earnestly appreciated.

Railway	Number	Type	Overall Length	City or Interurban	Miscellaneous	One or Two Man
Aberdeen Railroad	1	Misc.	..		Mot.	..
Alabama City, Cahaba & Milledge Ry.	1	Pass.	44	Int.	Mot.	Two
Alton, Granite & St. Louis Trac. Co.	3	Pass.	53 1/2	Int.	Mot.	Two
Appalachian Power Co.	1	Pass.	33 1/2	Int.	Trail.	..
Appalachian Power Co.	1	Pass.	33 1/2	City	Mot.	Two
Augusta-Aiken Ry. & Elec. Corp.	4	Pass.	47 1/2	City	Mot.	Two
Austin Street Ry.	4	Pass.	30	City	Mot.	One
Bangor Ry. & Elec. Co.	3	Pass.	30	City	Mot.	One
Beaumont Trac. Co.	7	Pass.	30	City	Mot.	Two
Blue Ridge Lt. & Pwr. Co.	4	Pass.	25	City	Mot.	One
Boston & Worcester St. Ry.	6	Misc.	45		Mot.	..
Boston Elevated Ry.	25	Pass.	66	City	Mot.	Train
	1	Pass.	28	City	Mot.	..
	7	Misc.	40 1/2	City	Mot.	..
Bristol & Plainville Trolley Co.	2	Pass.	36	Int.	Mot.	Two
Brownston & Plainfield St. Ry.	2	Pass.	29 1/2	City	Mot.	One
Brooklyn Rapid Transit Co.	1	Misc.	47	City	Trail.	..
	2	Misc.	50	City	Mot.	..
Buffalo & Depew Ry.	1	Loco	84		16 tons	..
Burlington County Transit Co.	1	Pass.	41	Int.	Mot.	Two
Cape Breton Elec. Co.	2	Pass.	28	City	Mot.	One
Cedar Rapids & Marion City Ry.	15	Pass.	31	City	Mot.	Either
	10	Pass.	37 1/2	City	Mot.	Either
Centralia & Central City Trac. Co.	2	Pass.	28	City	Mot.	One
Chambersburg, Greencastle & Waynesboro St. Ry.	1	Misc.	24		Mot.	..
Charleston-Dunbar Trac. Co.	2	Pass.	45	City	Mot.	Two
Charleston Interurban R.R.	1	Misc.	45	Int.	Mot.	..
	4	Pass.	38	Int.	Mot.	Two
Chicago & West Towns Ry.	5	Pass.	45	City	Mot.	Two
Chicago, Milwaukee & St. Paul Ry.	3	Locos.	76		70 tons	..
	3	Locos.	76		265 tons	..
	10	Locos.	90 1/2		260 tons	..
Chicago, No. Shore & Milwaukee R.R.	2	Locos.	37 1/2		50 tons	..
Chicago, So. Bend & No. Indiana Ry.	5	Misc.	40	Int.	Trail.	..
Chicago Surface Lines	3	Misc.	49	City	Mot.	..
Cincinnati & Columbus Trac. Co.	1	Misc.	50	Int.	Mot.	..
Cleveland Ry.	25	Pass.	49	City	Trail.	..
	2	Misc.	28		Mot.	..
	51	Pass.	49	City	Trail.	..
Cleveland, Southwestern & Col. Ry.	2	Pass.	22	City	Mot.	One
Colorado Springs & Int. Ry.	11	Pass.	28	City	Mot.	One
Columbia Ry. Gas & Elec. Co.	28	Pass.	47		Mot.	Two
Columbia Railroad	8	Pass.	28	City	Mot.	One
Columbus Ry. Pwr. & Lt. Co.	10	Pass.	48	City	Mot.	Two
Conestoga Trac. Co.	8	Pass.	44	City	Mot.	Two
	2	Misc.	4	Int.	Mot.	Two
Cumberland & Westernport Elec. Ry.	5	Pass.	45	Int.	Mot.	Two
Cumberland County Pwr. & Lt. Co.	8	Pass.	44	City	Trail.	..
	2	Misc.	36		..	..
Danville St. Ry. & Lt. Co.	4	Pass.	41	City	Mot.	Two
Dayton, Covington & Piqua Trac. Co.	2	Pass.	50	Int.	Mot.	Two
Dayton, Springfield & Xenia Southern Ry.	2	Pass.	43 1/2	Int.	Mot.	Two
Denver Tramway	1	Misc.	17		Mot.	..
	1	Misc.	10		Trail.	..
	2	Misc.	40		Mot.	..
Duluth Street Ry.	8	Pass.	46	City	Mot.	Two
	1	Misc.	..		Mot.	..
Durham Trac. Co.	2	Pass.	30	City	Mot.	Either
E. Liverpool Trac. & Lt. Co.	1	Misc.	40 1/2		Mot.	..

Railway	Number	Type	Overall Length	City or Interurban	Motor or Trailer	One or Two Man	Railway	Number	Type	Overall Length	City or Interurban	Motor or Trailer	One or Two Man
East St. Louis Ry.	5	Pagr.	46½	City	Mot.	Two	Northern Texas Trac. Co.	20	Pagr.	28	City	Mot.	One
Eastern Pennsylvania Rys.	25	Pagr.	41	City	Mot.	Two	No. Kankakee Elec. Lt. & Ry.	2	Pagr.	32	City	Mot.	Either
Eastern Wisconsin Elec. Co.	8	Pagr.	50	Int.	Mot.	Two	Northwestern Pennsylvania Ry.	2	Misc.	36	Int.	Trail.	..
El Paso Electric Ry.	2	Misc.	28	..	..	..	5	Pagr.	47	Int.	Mot.	Two	..
Enid City Ry.	1	Misc.	46	Int.	Mot.	..	6	Pagr.	28	City	Mot.	One	..
Fairburn & Atlanta Ry. & Elec. Co.	10	Pagr.	30	City	Mot.	One	2	Misc.	46	Int.	Mot.	Two	..
Fonda, Johnston & Gloversville R.R.	2	Pagr.	30	City	Mot.	One	4	Misc.	50	Int.	Mot.	..	..
Fort Dodge, Des Moines & Sohn R.R.	4	Pagr.	33½	City	Mot.	Two	16	Misc.	38½	Int.	Trail.	..	..
Fort Dodge Street Ry.	2	Pagr.	47	Int.	Mot.	Two	10	Misc.	40	Int.	Trail.	..	..
Fort Wayne & Decatur Trac. Co.	1	Pagr.	30	City	Mot.	One	12	Pagr.	41	City	Mot.	Two	..
Fort Wayne & Decatur Trac. Co.	3	Pagr.	47	Int.	Mot.	Two	4	Pagr.	40	Int.	Mot.	Two	..
Fort Wayne & No. Indiana Trac. Co.	1	Misc.	40	Int.	Mot.	..	1	Locos.	36	30 tons	..	..	..
Fox & Illinois Union Ry.	10	Pagr.	41	City	Mot.	Two	40	Pagr.	45	City	Mot.	Two	..
Gary & Interurban R.R.	2	Misc.	53	Int.	Mot.	..	1	Pagr.	18	Int.	Mot.	One	..
Georgia Ry. & Pwr. Co.	1	Misc.	50	Int.	Mot.	Two	1	Pagr.	28	Int.	Mot.	Two	..
Glendale & Montrose Ry.	4	Pagr.	44	Int.	Trail.	..	3	Pagr.	45	City	Mot.	Two	..
Grafton & Upton R.R.	2	Pagr.	44	Int.	Mot.	Two	3	Pagr.	45	City	Mot.	Two	..
Gd. Rapids, Gd. Haven & Muskegon.	10	Pagr.	40	..	..	..	3	Misc.	40	Int.	..	..	..
Gray's Harbor Ry.	3	Pagr.	26	30 tons	..	..	2	Pagr.	28	City	Mot.	One	..
Hagerstown & Frederick Ry.	3	Misc.	44	Int.	Mot.	..	1	Loco.	76	250 tons	..	..	..
Hammond, Whiting & E. Chicago Ry.	1	Pagr.	55	Int.	Mot.	Two	1	Misc.	36	..	Mot.	..	..
Harrisburg Rys.	6	Pagr.	31	City	Mot.	One	18	Pagr.	41	City	Mot.	Two	..
Hocking-Sunday Creek Trac. Co.	3	Pagr.	48	Int.	Mot.	Two	10	Pagr.	44	City	Trail.	..	..
Holyoke Street Ry.	2	Pagr.	52	City	Mot.	Two	1	Misc.	50	Int.	Mot.	..	..
Honolulu Rapid Trans. & Land Co.	5	Pagr.	44	City	Mot.	Two	6	Pagr.	37	City	Mot.	One	..
Hot Springs Street Ry.	1	Pagr.	47	Int.	Mot.	Two	2	Pagr.	47	..	Mot.	Two	..
Illinois Traction System.	2	Misc.	40	City	Mot.	..	50	Pagr.	45	City	Trail.	..	..
Indiana Ry. & Lt. Co.	1	Misc.	28	City	Mot.	..	3	Pagr.	48	City	Trail.	One	..
Interborough Rapid Transit Co.	10	Pagr.	40	City	Mot.	Two	1	Pagr.	34	Int.	Mot.	Two	..
International Ry.	7	Pagr.	28	City	Mot.	One	1	Pagr.	25	City	Mot.	One	..
Interstate Public Service Co.	2	Pagr.	39	City	Mot.	Two	100	Pagr.	51½	City	Mot.	Two	..
Inter Urban Ry.	337	Pagr.	51	City	Mot.	Train	50	Pagr.	48½	City	Mot.	Two	..
Johnstown Trac. Co.	140	Pagr.	51	City	Trail.	..	10	Pagr.	28	City	Mot.	One	..
Kankakee & Urbana Trac. Co.	100	Pagr.	50	City	Mot.	Two	24	Pagr.	28	City	Mot.	One	..
Knoxville Ry. & Lt. Co.	4	Misc.	28	..	..	..	2	Pagr.	41	City	Mot.	Two	..
Lake Shore Elec. Ry.	3	Misc.	60	Int.	Trail.	..	6	Pagr.	46	Int.	Mot.	Two	..
Lancaster & York Furnace Lt. Ry.	1	Misc.	60	Int.	Mot.	..	3	Pagr.	34	City	Mot.	Either	..
Lehigh Valley Transit Co.	2	Locos.	60 tons	..	..	..	2	Misc.	38	..	Mot.	..	..
Lewiston, Augusta & W'le St. Ry.	10	Pagr.	40	City	Mot.	Two	6	Pagr.	41	City	Mot.	Two	..
Linwood Street Ry.	6	Pagr.	47½	City	Mot.	Two	13	Pagr.	41½	City	Mot.	..	..
Little Rock Ry. & Elec. Co.	5	Pagr.	33	City	Mot.	Two	5	Pagr.	46	City	Trail.	..	..
London Street Ry.	5	Pagr.	49	City	Mot.	Two	6	Pagr.	41	City	Mot.	Two	..
Lorain Street R.R.	10	Pagr.	28	City	Mot.	One	20	Pagr.	26	City	Trail	One	..
Louisville & So. Indiana Trac. Co.	6	Misc.	40½	Int.	Trail.	..	2	Pagr.	46	City	Mot.	Two	..
Louisville Ry.	6	Pagr.	41	City	Mot.	Two	1	Pagr.	57	Int.	Mot.	Two	..
Macon Ry. & Lt. Co.	1	Misc.	38	..	..	..	3	Pagr.	34	City	Mot.	Two	..
Madison Rys.	5	Pagr.	28	City	Mot.	One	6	Misc.	42½	Int.	Trail.	..	..
Mahoning & Shenango Ry. & Lt. Co.	13	Pagr.	46½	City	Mot.	Two	6	Pagr.	30	City	Mot.	One	..
Mason City & Clear Lake R.R.	3	Pagr.	49	Int.	Mot.	Two	1	Pagr.	32½	City	Mot.	Either	..
Massachusetts Northeastern St. Ry.	5	Pagr.	31	City	Mot.	One	2	Misc.	45	Int.	Mot.	Two	..
Michigan Ry.	12	Pagr.	50	Int.	Mot.	Two	7	Pagr.	39	City	Mot.	One	..
Milwaukee Electric Ry. & Lt. Co.	4	Pagr.	61	City	Mot.	Two	1	Pagr.	28	City	Mot.	One	..
Monongahela Valley	2	Pagr.	53	Int.	Trail.	..	4	Pagr.	47	Int.	Mot.	Two	..
Montreal & So. Counties Ry.	3	Pagr.	55	Int.	Mot.	Two	1	Misc.	60	..	..	..	..
Montreal Tramways	50	Pagr.	44	City	Mot.	Trail.	2	Misc.	36	City	Mot.	..	..
Morgantown & Wheeling Ry.	50	Pagr.	47	City	Trail.	..	2	Misc.	40½	City	Mot.	..	..
Nashville Interurban Ry.	1	Pagr.	45	Int.	Mot.	Two	2	Misc.	36	..	Trail.	..	..
Newport News & Hampton Ry. Gas. & Elec. Co.	6	Pagr.	49	City	Mot.	Two	2	Misc.	50	Int.	Mot.	..	..
New York Central R.R.	30	Pagr.	67	Int.	Mot.	Train	6	Pagr.	40	City	Mot.	Two	..
New York, New Haven & Hartford R.R.	1	Loco.	62	145 tons.	..	..	4	Pagr.	51	Int.	Mot.	Two	..
New York State Rys. (Rochester).	5	Locos.	69	180 tons.	..	..	2	Pagr.	42	Int.	Mot.	..	..
New York State Rys. (Syracuse).	2	Misc.	28	City	Mot.	..	1	Misc.	32½	40 tons	..	..	..
No. Carolina Public Service Co.	25	Pagr.	47½	City	Mot.	Two	3	Pagr.	55	Int.	Mot.	Two	..
Northern Elec. Co.	1	Pagr.	60½	Int.	Trail.	..	3	Pagr.	55	Int.	Trail.	..	..
Northern Ohio Trac. & Lt. Co.	1	Misc.	28	City	Mot.	..	50	Pagr.	44	City	Mot.	Trail.	..
Omaha, Lincoln & Beatrice Ry.	10	Pagr.	46½	City	Mot.	Two	50	Pagr.	45	City	Trail	..	..
Ottawa Electric Ry.	10	Pagr.	41	City	Mot.	Two	4	Pagr.	28	City	Mot.	One	..
Pacific Electric Ry.	2	Misc.	40	Int.	..	..	20	Pagr.	45	City	Mot.	Two	..
Pacific Power & Lt. Co.	2	Pagr.	28	City	Mot.	One	1	Misc.	43	..	Mot.	..	..
Pennsylvania R.R. (Elec. Div.)	1	Loco.	76	250 tons	..	..	3	Pagr.	31	City	Mot.	One	..
Pennsylvania & Ohio Rys.	1	Misc.	36	..	..	..	6	Pagr.	44	City	Mot.	Two	..
Peoria Ry.	18	Pagr.	41	City	Mot.	Two	1	Misc.	46	..	..	..	..
Peoples Ry. of ..	10	Pagr.	44	City	Trail	..	8	Locos.	58	47 tons.	..	..	..
Philadelphia & Garrettford St. Ry.	1	Misc.	50	Int.	Mot.	..	2	Pagr.	47	Int.	Mot.	Two	..
Pittsburg County Ry.	6	Pagr.	37	City	Mot.	One	2	Pagr.	28	City	Mot.	One	..
Pittsburg, Harmony, Butler & New Castle Ry.	2	Pagr.	47	..	..	..	2	Pagr.	49	City	Mot.	Two	..
Pittsburgh Rys.	50	Pagr.	45	City	Trail.	..	14	Pagr.	49	City	Mot.	Two	..
Portsmouth St. R.R. & Lt. Co.	3	Pagr.	48	City	Trail.	One	1	Misc.	..	City	Mot.	..	..
Princeton Power Co.	1	Pagr.	34	Int.	Mot.	Two	5	Pagr.	28	City	Mot.	One	..
Public Service Ry.	100	Pagr.	51½	City	Mot.	Two	5	Pagr.	46	City	Trail.	..	..
Puget Sound Int. Ry. & Pwr. Co.	50	Pagr.	48½	City	Mot.	Two	8	Locos.	58	47 tons.	..	..	..
Puget Sound Trac. Lt. & Pwr. Co.	10	Pagr.	28	City	Mot.	One	2	Pagr.	47	Int.	Mot.	Two	..
Quebec Ry., Lt. & Pwr. Co.	24	Pagr.	28	City	Mot.	One	2	Pagr.	28	City	Mot.	One	..
Reading Transit & Lt. Co.	2	Pagr.	41	City	Mot.	Two	1	Misc.	40½	..	Mot.	..	..
Rhode Island Co.	6	Pagr.	46	Int.	Mot.	Two	1	Misc.	40½	..	Mot.	..	..
Roanoke Ry. & Elec. Co.	3	Pagr.	34	City	Mot.	Either	8	Pagr.	..	City	Mot.	One	..
Rockford & Interurban Ry.	13	Pagr.	41½	City	Mot.	..	32	Pagr.	28	City	Mot.	One	..
Salt Lake, Garfield & Western Ry.	5	Pagr.	46	City	Trail.	..	23	Pagr.	28	City	Mot.	One	..
San Antonio Public Service Co.	6	Pagr.	56	Int.	Mot.	Train	1	Pagr.	31	City	Mot.	One	..
Sand Springs Ry.	20	Pagr.	26	City	Trail	One	1	Pagr.	55	Int.	Mot.	Two	..
Sandwich, Windsor & Am'b'g Ry.	2	Pagr.	46	City	Mot.	Two	2	Misc.	38	Int.	Trail	..	..
Scioto Valley Trac. Co.	3	Pagr.	34	Int.	Mot.	Two	1	Misc.	43	Int.	Trail.	Two	..
Seattle Municipal St. Ry.	6	Misc.	42	Int.	Trail.	..	5	Misc.	40	Int.	Trail	..	..
Sherbrooke Ry. & Pwr. Co.	6	Pagr.	30	City	Mot.	One	2	Misc.	40	Int.	Trail	..	..
Shore Line Electric Ry.	1	Pagr.	32½	City	Mot.	Either	3	Pagr.	27	City	Mot.	One	..
Sioux City Service Co.	2	Misc.	45	Int.	Mot.	Two	4	Pagr.	60	Int.	Mot.	Two	..
Sioux Falls Trac. System	7	Pagr.	39	City	Mot.	One	10	Pagr.	43	City	Mot.	Two	..
Slate Belt Elec. St. Ry.	1	Pagr.	28	City	Mot.	One	3	Pagr.	42½	City	Mot.	Two	..
Southern New York Pwr. & Ry. Corp.	4	Pagr.	47	Int.	Mot.	Two	1	Loco.	30	30 tons	..	..	..
Southwest Missouri R.R.	1	Misc.	..	..	..	..	8	Misc.	36½	City	Mot.	..	..
Springfield Street Ry.	7	Pagr.	44	Int.	Mot.	Two	34	Pagr.	46½	City	Mot.	..	..
St. Joseph Ry., Lt., Ht. & Pwr. Co.	20	Pagr.	43½	City	Mot.	Two	1	Misc.	37	..	Mot.	..	..
Tacoma Ry. & Pwr. Co.	2	Misc.	40½	..	..	..	1	Misc.	27	City	Trail.	..	..
Tampa Electric Co.	1	Misc.	40½	..	..	..	3	Pagr.	31	City	Mot.	One	..
Tarentum, Brackenridge & Butler St. Ry.	8	Pagr.	..	City	Mot.	One	6	Pagr.	44	City	Mot.	Two	..
Terre Haute Trac. & Lt. Co.	1	Pagr.	31	City	Mot.	One	1	Misc.	43	..	Mot.	..	..
Terre Haute, Indianapolis & Eastern Ry.	1	Pagr.	55	Int.	Mot.	Two	80	Pagr.	46½	City	Mot.	Two	..
Three Rivers Trac. Co.	2	Misc.	38	Int.	Trail	..	12	Misc.	40½	..	Mot.	..	..
Toledo, Bowling Green & So. Trac. Co.	1	Misc.	43	Int.	Trail.	Two	40	Pagr.	45	City	Trail	..	..
Trenton & Mercer County Trac. Corp.	5	Misc.	40	Int.	Trail	..	1	Misc.	30	..	..	..	..
Tri-City Ry. of Iowa	3	Pagr.	42½	City	Mot.	Two	4	Pagr.	28	City	Mot.	One	..
Tuscaloosa Ry. & Utilities Co.	10	Pagr.	43	City	Mot.	Two	20	Pagr.	45	City	Mot.	Two	..
Twin City Rapid Transit Co.	3	Pagr.	42½	City	Mot.	Two	1	Misc.	..	..	..	..	..
Twin State Gas & Elec. Co.	8	Misc.	36½	City	Mot.	..	3	Pagr.	31	City	Mot.	One	..
Union Street Ry.	34	Pagr.	46½	City	Mot.	..	6	Pagr.	44	City	Mot.	Two	..
United Rys. & Elec. Co. (Baltimore)	1	Misc.	37	..	..	..	1	Misc.	43	..	Mot.	..	..
United Rys. of St. Louis	80	Pagr.	46½	City	Mot.	Two	40	Pagr.	45	City	Trail	..	..
Vicksburg Light & Trac. Co.	12	Misc.	40½	..	..	..	1	Misc.	30	..	..	..	..
Virginia Ry. & Pwr. Co.	40	Pagr.	45	City	Trail	..	4	Pagr.	28	City	Mot.	One	..
Washington, Balt. & Annapolis Elec. R.R.	20	Pagr.	45	City	Mot.	Two	8	Locos.	58	47 tons.	..	..	..
Western New York & Penna. Trac. Co.	4	Pagr.	28	City	Mot.	One	2	Pagr.	47	Int.	Mot.	Two	..
Western Washington P													

Track Rebuilt and New Track Placed in Service in the Year 1917

Electric Railways of the United States and Canada Report a Total of 442 Miles of Track Constructed or Electrified During the Year. This Is Less Than in Any Corresponding Period During the Last Ten Years—Approximately an Equal Amount of Track Was Rebuilt

THE results of a canvass of the electric railways of the United States and Canada to determine the single-track mileage of lines built or electrified and placed in operation during the year 1917, and also the amount of track reconstructed, are shown in the accompanying lists. Although reports were not received from all of the companies, the data can be considered representative of 97 per cent of the total mileage under electric operation, and this is quite satisfactory in view of the difficulties involved in conducting a canvass of such wide scope.

The following table, which was prepared from previous compilations by the ELECTRIC RAILWAY JOURNAL, shows that the additions made during the past year to the electric railway trackage were considerably less than for any year since 1907. Exclusive of electrified steam lines there were 376.7 miles of new electric railway track built, of which 71.1 miles were represented by new rapid transit lines in Greater New York and 305.6 miles by additions to various city and interurban lines. Although a comparison of the new electrified mileage placed in operation in the last two years shows a large decrease for 1917, the 1916 figure was greatly augmented by the 225-mile extension of the Chicago, Milwaukee & St. Paul electrification, and exclusive of this project the amount of new electrified line for the past year represents a slight increase.

	New Electric Railway Track Built	Electrified Steam Line	Total New Electric Mileage
1907.....	.....	.....	1880.0
1908.....	1174.5	84.0	1258.5
1909.....	774.7	112.4	887.1
1910.....	1204.8	192.4	1397.2
1911.....	1105.0	86.5	1191.5
1912.....	869.4	80.8	950.2
1913.....	974.9	119.0	1093.9
1914.....	716.5	229.0	946.4
1915.....	596.0	448.2	1044.2
1916.....	356.3	388.0	744.3
1917.....	376.7	66.0	442.7

The 376.7 miles of new line constructed and placed in operation can be divided roughly into two-thirds city and one-third interurban track. In 1916 the interurban track represented two-thirds of the total and the city track one-third. The number of states represented in the accompanying lists is practically the same as a year ago, while the number of companies that reported new work is about 15 per cent greater.

Among the states in which new track was reported, New York leads with 82.9 miles, consisting, as already stated, principally of extensions to the rapid transit lines in Greater New York. This figure compares favorably with the 78.4 miles constructed during 1916 in the State of California, which was the largest amount of new construction done in any one state, excepting, of course, Montana, in which a large amount of steam road had been electrified. In California and Ohio about 33 miles of new track have been built during the last year, this being the second largest amount reported for any state. This, of course, does not include Oregon where

the greater part of the new line indicated was an extension of the Portland electrified division of the Southern Pacific Company.

Electric railway construction in Canada suffered a decline from the good record of 1916, due, no doubt, to effects of the war. While several companies are mentioned, by far the greater proportion of work done has been in rebuilding existing track.

The total rebuilt mileage for the year was 375.4, about 85 per cent of which was city track. The Connecticut Company seems to have been most active in this regard, having rebuilt a total of 25 miles. Since corresponding data were not compiled in previous years, no figures are available to use as a basis for comparison.

	New Track, Miles	Rebuilt Mileage
ARKANSAS		
Fort Smith Light & Trac. Co.....	1.0	1.4
	1.0	1.4
CALIFORNIA		
Los Angeles Ry. Corporation.....		10.1
Municipal Ry. of San Francisco.....	11.7	
Northern Electric Ry.....	0.4	0.36
Pacific Electric Ry.—La Habra to Fullerton.....	5.06	
San Diego Electric Ry.....	2.34	0.77
Tidewater Southern Ry.—Hatch to Hilmar, 8 miles; Small to Mateca, 6 miles.....	14.0	
United Railroads of San Francisco.....		4.26
	33.50	15.49
COLORADO		
Colorado Springs & Interurban Ry.....	0.90	1.5
Denver & Interurban R. R.—Electrification extended 1.67 miles in Boulder.....	2.11	
Denver Tramway.....	0.67	0.54
	3.68	2.04
CONNECTICUT		
Connecticut Co.....	2.57	25.06
Danbury & Bethel St. Ry.....		1.0
	2.57	26.06
DELAWARE		
Wilmington & Philadelphia Trac. Co.....		6.04
		6.04
DISTRICT OF COLUMBIA		
Washington & Maryland Ry.....	0.87	
Washington Ry. & Electric Co.....	1.35	
	2.22	
FLORIDA		
Jacksonville Traction Co.....	0.7	
Key West Electric Co.....		0.25
Miami Traction Co.....	1.5	
Tampa Electric Co.....	0.75	
	2.95	0.25
GEORGIA		
Athens Ry. & Electric Co.....		0.25
Columbus Railroad.....		2.0
Georgia Ry. & Power Co.....	4.0	
Macon Ry. & Light Co.....		1.8
Valdosta Street Ry.....	1.0	
	5.0	4.05
IDAHO		
Boise Valley Trac. Co.....	0.5	
	0.5	
ILLINOIS		
Alton, Granite & St. Louis Trac. Co.....		0.53
Bloomington & Normal Ry. & Light Co.....		1.23
Central Illinois Public Service Co.....	0.31	0.03
Chicago & Interurban Trac. Co.....		2.5
Chicago & Joliet Electric Ry.....		2.0
Chicago & West Towns Ry.....	1.0	
Chicago, North Shore & Milwaukee R. R.....	4.33	2.02
Chicago, Ottawa & Peoria Ry.....	0.28	0.38
Chicago, So. Bend & No. Indiana Ry.....	5.1	0.4
Danville, Urbana & Champaign Ry.....		3.57
Decatur Ry. & Lt. Co.....		0.43
East St. Louis & Suburban Ry.....		2.3
East St. Louis Ry.....		0.19
Galesburg & Kewanee Elec. Ry.....		0.8
Galesburg Ry., Ltg. & Pwr. Co.....	0.09	

	New Track, Miles	Rebuilt Mileage		New Track, Miles	Rebuilt Mileage
ILLINOIS (Continued)			NEW YORK (Continued)		
Hammond, Whiting & E. Chicago Ry.....		2.0	Hudson Valley Ry.....		2.0
Jacksonville Ry. & Light Co.....		1.0	Interborough Rapid Transit Co.....	52.01	
Peoria Ry.		6.0	International Ry.	2.1	6.59
Rockford & Interurban Ry.—New track built from Rockford to Camp Grant.....	3.0	0.4	New York & Stamford Ry.....		0.28
Rockford City Trac. Co.....	0.34	0.8	New York Central R. R. (Elec. Div.).....	0.55	
St. Louis, Peoria & Springfield R. R.....		0.25	New York, Westchester & Boston Ry.....	0.01	
Southern Illinois Lt. & Pwr. Co.....	0.37		Niagara Junction Ry.....	0.77	
Tri-City Ry. of Illinois.....	0.19	0.91	Orange County Trac. Co.....	0.5	0.5
	15.01	27.74	Schenectady Ry.	0.2	0.51
INDIANA			Second Ave. Ry.		0.3
Central Indiana Lighting Co.....		0.24	Southern New York Pwr. & Ry. Corp.....	0.34	1.75
Indianapolis Trac. & Term. Co.....	1.4	2.27	Third Ave. Ry.....	0.11	0.7
Interstate Public Service Co.....	0.96	0.06	Westchester Street R. R.....		
Madison Light & Ry. Co.....		0.43		82.91	23.85
Public Utilities Co.....	0.38		NORTH CAROLINA		
Terre Haute, Indianapolis & Eastern Trac. Co.....	0.34		Southern Public Utilities Co.—Between Charlotte and Camp Greene.....	4.75	
Terre Haute Trac. & Light Co.....		0.55		4.75	
Union Traction Co. of Indiana.....	0.87	2.5	NORTH DAKOTA		
	4.55	6.05	Northern States Pwr. Co.....		1.0
IOWA					1.0
Cedar Rapids & Marlon City Ry.....		\$6	OHIO		
Clinton, Davenport & Muscatine Ry.....	0.06	2.0	Cincinnati, Milford & Loveland Trac. Co.....		10.0
Dubuque Elec. Co.....			Cincinnati Trac. Co.....		4.92
Fort Dodge, Des Moines & Southern R. R.—Fort Dodge to Webster City and Lehigh.....	25.0	0.57	City Ry. of Dayton.....		2.25
Keokuk Electric Co.....		1.5	Cleveland Ry.	10.61	15.43
Mason City & Clear Lake R. R.....	0.12	0.21	Cleveland Southwestern & Col. Ry.....		3.0
Oskaloosa Trac. & Light Co.....		0.5	Columbus Ry., Pwr. & Lt. Co.....	0.82	1.85
Sioux City Service Co.....	2.62	1.64	Dayton & Troy Elec Ry.....		3.0
Tri-City Ry. of Iowa.....		10.02	Gallipolis & Northern Trac. Co.....	0.15	
	28.30	2.65	Mahoning & Shenango Ry. & Lt. Co.....	1.72	0.91
KANSAS			Northern Ohio Trac. & Light Co.....	2.1	5.58
Joplin & Pittsburg Ry.....		1.0	Portsmouth Street R. R. & Lt. Co.—Between Wheelersburg and Ironton.....	18.0	2.5
Kansas City, Lawrence & Topeka Elec. R. R.....	0.5			33.40	49.44
Southwest Missouri R. R.—Electrified between Galena, Kan., and Baxter Springs, Kan.....	8.0	0.66	OKLAHOMA		
Topeka Ry.		0.9	Ardmore Ry.	0.3	0.9
Wichita R. R. & Light Co.....		5.21	Oklahoma Ry.....	0.5	0.6
	8.5	0.6		0.8	1.5
KENTUCKY			OREGON		
Kentucky Trac. & Terminal Co.....		0.82	Pacific Pwr. & Lt. Co.....		3.5
Louisville Ry.—Extension to Camp Taylor.....	4.0		Portland & Oregon City Ry.....	1.0	
So. Covington & Cincinnati St. Ry.....		1.42	Portland Ry., Lt. & Pwr. Co.....	1.95	1.83
	4.0		Southern Pacific Co. (Portland Div.)—Electrification between Whiteson and Corvallis.....	47.5	
MAINE				50.45	5.33
Bangor Ry. & Electric Co.....		1.33	PENNSYLVANIA		
Cumberland County Pwr. & Lt. Co.....	0.28	1.87	Altoona & Logan Valley Elec. Ry.....	0.85	
Lewiston, Augusta & Waterville St. Ry.....	1.78	0.78	Ardmore & Llanerch St. Ry.....	0.93	0.5
	2.06	3.98	Carbon Transit Co.....		0.62
MARYLAND			Harrisburg Rys.....		0.65
Cumberland & Westernport Elec. Ry.....		1.32	Mahoning & Shenango Ry. & Lt. Co.....	0.66	1.0
Cumberland Electric Ry.....	1.0	13.3	Montgomery Transit Co.....		1.09
United Railways & Electric Co.....	5.03		Northwestern Pennsylvania Ry.....	3.65	
Washington, Baltimore & Annapolis Elec. R. R.— Naval Academy Junction to Camp Meade.....	4.5	14.62	Philadelphia & Garrettsford St. Ry.....	0.31	0.5
	10.53	5.8	Philadelphia Rys.....		16.33
MASSACHUSETTS			Philadelphia Rapid Transit Co.....	0.71	4.17
Bay State Street Ry.....		1.2	Reading Transit & Light Co.....		0.5
Berkshire Street Ry.....	11.0	4.08	Scranton Ry.		1.0
Massachusetts Northeastern St. Ry.....		0.34	Wilkes-Barre Ry.	0.28	0.75
Norfolk & Bristol St. Ry.....			York Rys.		
Plymouth & Sandwich St. Ry.—Plymouth to village of Sagamore.....	11.07	2.2		7.39	27.11
Springfield Street Ry.....	3.17	2.68	RHODE ISLAND		
Union Street Ry.....	1.49	4.7	Rhode Island Co.....	1.44	5.36
Worcester Consolidated St. Ry.....		21.00		1.44	5.36
	26.73	0.73	SOUTH CAROLINA		
MICHIGAN			Columbia Ry., Gas & Electric Co.—To Camp Jack- son, 8 miles.....	10.0	
Detroit & Port Huron Shore Line Ry.....	2.03	0.5		10.0	
Detroit, Jackson & Chicago Ry.....	0.75	11.39	SOUTH DAKOTA		
Detroit, Monroe & Toledo Short Line Ry.....	14.87	3.51	Aberdeen R. R.		0.6
Detroit United Ry.....		1.5	Sioux Falls Trac. System.....		1.0
Grand Rapids Ry.....		0.5			1.6
Grand Trunk Ry. (St. Clair Tunnel Co.).....		0.51	TENNESSEE		
Menominee & Marinette Lt. & Trac. Co.....		18.14	Chattanooga Ry. & Light Co.....	3.0	2.0
Saginaw-Bay City Ry.....		13.52	Jackson Ry. & Light Co.....	0.3	0.75
	18.25	0.5	Memphis Street Ry.		4.56
MINNESOTA			Nashville Ry. & Light Co.....		
Twin City Rapid Transit Co.....	6.79	14.02		3.3	7.31
St. Cloud Public Service Co.....			TEXAS		
	6.79	0.5	Austin Street Ry.	1.5	
MISSOURI			Beaumont Trac. Co.....	0.15	0.66
Blue Valley Ry.....	1.5	6.0	Bryan & Central Texas Interurban Ry.—New track between Whittaker and Wilcox.....	2.25	1.0
Hannibal Ry. & Elec. Co.....		5.08	Bryan & College Interurban Ry.....		2.5
Kansas City Rys.....	10.81	19.5	El Paso Electric Ry.....		1.6
United Railways of St. Louis.....		31.08	Galveston Electric Co.....		0.7
	12.31	3.0	Jefferson County Trac. Co.....	0.11	
NEW JERSEY			Marshall Traction Co.....	4.7	
Morris County Trac. Co.....		0.39	Northern Texas Trac. Co.....	4.2	
Public Service Ry.....	0.15		San Antonio Public Service Co.....	4.7	3.55
Trenton & Mercer County Trac. Corp.....		3.39	Southwestern Trac. Co.....		1.2
	0.15		Tarrant County Trac. Co.....	1.02	
NEW YORK			Texas Electric Ry.....	1.55	
Auburn & Syracuse Elec. R. R.....	0.21	1.73		20.18	11.21
Binghamton Ry.....			UTAH		
Brooklyn Rapid Transit Co.—New track: 19.1 miles rapid transit; 6.18 miles surface lines.....	25.28	6.72	Ogden, Logan & Idaho Ry.....		2.7
Buffalo & Depew Ry.....		0.5	Salt Lake & Utah R. R.—Between Grangee and Magna.....	9.0	
Elmira Water, Light & R. R. Co.....	0.83	2.14		9.0	2.7
Hornell Traction Co.....		0.13			

	New Track, Miles	Rebuilt Mileage
VIRGINIA		
Danville Traction & Pwr. Co.....	.02	
Hampton & Langley Field Ry.—Between Hampton and Government Reservation at Langley Field..	3.5	
Roanoke Ry. & Elec. Co.....	1.0	
Virginia Ry. & Pwr. Co.....	2.23	0.93
	6.75	0.93
WASHINGTON		
Puget Sound Int. Ry. & Pwr. Co.....	0.25	
Puget Sound Trac., Lt. & Pwr. Co.....		0.19
Seattle & Rainier Valley Ry.....	1.25	2.0
Tacoma Ry. & Pwr. Co.....	2.0	
Yakima Valley Transportation Co.....	3.55	
	7.05	2.19
WEST VIRGINIA		
Monongahela Valley Trac. Co.....	5.5	0.8
Norfolk & Western Ry. (Elec. Div.)—Electrified be- tween Cooper and Simmons.....	7.5	
Ohio Valley Electric Ry.....		0.87
	13.0	1.67
WISCONSIN		
Eastern Wisconsin Elec. Co.....		3.99
Milwaukee Electric Ry. & Lt. Co.....	2.19	5.84
Wisconsin Ry., Lt. & Pwr. Co.....		1.33
	2.19	11.16
CANADA		
Cape Breton Elec. Co., Ltd.....	0.15	1.0
Hull Electric Co.....	1.0	0.95
International Transit Co.		0.32
Janesville Trac. Co.		0.51
Levis County Ry.		0.57
London & Port Stanley Ry.....	0.34	
London Street Ry.		1.68
Niagara, St. Catharines & Toronto Ry.....	0.66	3.5
Nova Scotia Tramways & Pwr. Co., Ltd.....		0.17
Ottawa Electric Ry.		0.6
Port Arthur Civic Ry.....		1.51
Quebec Ry., Light & Pwr. Co.....	0.18	
Sandwich, Windsor & Amherstburg Ry.....		1.0
Sudbury, Copper Cliff Suburban Elec. Ry.....	1.0	
Toronto Civic Ry.	0.49	
	3.82	11.81
Total for all companies	442.7	375.4

California Joint Committee on Inductive Interference Completes Report*

A COMMITTEE which has, for the last five years, been investigating disturbances in communication circuits caused by induction from neighboring power circuits, under the auspices of the California Railroad Commission, has completed its work and presented its report.

A preliminary report, rendered by the committee in 1914, was printed in the Transactions of the American Institute of Electrical Engineers, Vol. 33, 1914, page 1441. The final report of the committee will be published by the commission if a sufficient number of subscriptions is received to cover the actual cost of printing and binding. This is estimated not to exceed \$10. It is proposed to publish thirty of the technical reports presented in the course of the work, selected as being of general interest and applicability.

The complete report contains the following sections:

1. Historical sketch, regarding the formation, personnel, organization, investigations and finances of the committee.

2. Review of the basic principles, comprising a simple statement of the nature of the subject, a summary of the facts established or agreed upon, and a concise statement of the guiding principles for the prevention of interference.

*Following are references to articles in this paper during the period covered by the report: June 8, 1912, page 963; June 15, 1912, pages 1002, 1019; Aug. 24, 1912, page 288; Aug. 31, 1912, pages 308, 336; March 15, 1913, page 512; March 22, 1913, page 531; Oct. 11, 1913, page 690; Nov. 19, 1913, page 1141; Jan. 10, 1914, page 82; Feb. 7, 1914, page 313; March 7, 1914, page 529; March 28, 1914, page 706; May 2, 1914, pages 958, 960; Sept. 12, 1914, page 485; Oct. 3, 1914, page 636. Since 1914 the matter has not had much attention in the electric railway field.

3. Recommendations for revised rules to govern the design, construction and operation of power and communication lines and associated apparatus, to prevent or mitigate inductive interference, followed by explanatory comments. An exhibit accompanying the rules discusses the arrangement and spacing of power conductors.

4. Five appendices dealing with: (1) Interference not covered by the recommended rules, which apply to constant-potential a.c. power circuits of more than 5000 volts between wires or 2900 volts to ground and exclude telephone subscribers' loops. (2) List of technical reports prepared by the committee as a record of its investigations. (3) Comments on the 1914 report. (4) Bibliography. (5) Chart showing the organization of the committee.

Send-Off for Mr. Cairns
Officials of the Manila Electric Railway & Light Corporation Pay Respect to Associate Departing for America

A STRIKING testimonial of the popularity with which L. S. Cairns, recently assistant general manager Manila Electric Railway & Light Corporation, has been regarded during his five-year connection with that company was shown by the ceremonies at his depar-



1200 PARTICIPATED IN PARADE FOR DEPARTING MANILA OFFICIAL

ture from Manila on Oct. 17 to take charge of the Eastern Pennsylvania Railways of Pottsville, Pa. One function of the farewell exercises was held in the Manila Grand Opera House on the evening of Oct. 15, at which this large house was crowded. After an interlude of music and other entertainments there was an address by Mr. Santiago of the claims department, a reply by Mr. Cairns, and closing remarks by Vice-President Duffy. The following day there was a formal parade to the pier. About 1200 employees of the company participated, marching in eight divisions, representing the different departments of the company, and acting as an escort for Mr. Cairns and his family, who followed in an auto. On arrival at the pier the lines opened, giving an opportunity to the former assistant general manager to bid farewell to all as he passed through the two lines.

In addition, a silver tablet, inscribed with best wishes for his future success, was presented to Mr. Cairns.

The Financial Wrecks of 1917

Electric Railway Receiverships and Foreclosure Sales, in Mileage and Capitalization Involved, Show Heavy Increase Over Those of 1916—This Due to One Large Company—Score of Small Companies Abandon Operation on Their 207 Miles of Track

THE high cost of electric railway operation during 1917 has left many a company in a disabled condition. The most striking result is the number of total wrecks. Heretofore, when electric railways have been forced into the hands of receivers because of accumulated burdens of regulation, unrestricted competition, over capitalization, or weaknesses of organization, they have almost invariably been able to effect some financial or operating readjustment so as to insure continuance of service.

The last year has seen about the usual number of companies either entering upon or completing their readjustments, but, more significant still, it has seen the passing of companies that have given up hope of any successful reorganization. A score of railway properties have suspended service and in most cases have dismantled or are planning to dismantle their lines. In many instances this action has been taken voluntarily by the management and not under court orders, and in several others the only willing purchaser at the forced sale has been the junk dealer.

Such total wrecks, it is true, have all been small properties, and some of them were probably constructed without adequate, if any, transportation studies, and have never even approached operation on a sound basis. Yet at other times they all would undoubtedly have tried to struggle along. Their collapse, in this period of inflated costs, simply shows that the industry is now passing through a stage where mere existence for its weakest members is being found impossible.

BAY STATE LINE SWELLS RECEIVERSHIP FIGURES

Owing to one large company, the Bay State Street Railway, the new receiverships in 1917 were greatly in excess of those in the preceding year, the mileage of 1,139.37 involved being, next to the record in 1915, the largest in the last nine years. The capitalization of companies placed in receiver's hands was nearly three times as large as in 1916, and the figures for outstanding stock and funded debt are well up the list for the nine years. The record for this period (adjusted in a minor point to cover a late 1916 return) follows:

	Number of Companies	Miles of Track	Outstanding Stock	Outstanding Funded Debt
1909.....	22	558.00	\$29,962,200	\$22,325,000
1910.....	11	696.61	12,629,400	75,490,735
1911.....	19	518.90	29,533,450	38,973,293
1912.....	26	373.58	20,410,700	11,133,800
1913.....	18	342.84	31,006,900	47,272,200
1914.....	10	362.39	35,562,550	19,050,460
1915.....	27	1,152.10	40,298,050	39,372,375
1916.....	15	359.26	14,476,600	10,849,200
1917.....	18	1,139.37	33,497,925	33,394,400

The accompanying table gives the details of electric railway receiverships in the last calendar year. An attempt was made in all cases to take the figures from the most up-to-date and most authoritative sources, and to secure the correct data in cases of disagreement among the financial manuals, a by no means infrequent occurrence in connection with the smaller com-

panies. These, it will be observed, constituted the great majority of the companies placed in receivership, only three having more than 30 miles of track. The 867 miles of the Bay State receivership formed more than 75 per cent of the whole sum.

Most of the receiverships were evidently caused by the decreasing margin between revenues and expenses, operation in territory of a poor character, and inherent defects of organization; but in certain cases special reasons existed. The Bay State Street Railway, for example, was confronted with unusual cash requirements and a lack of borrowing capacity, and the receivership is a "breathing spell." The Cincinnati, Milford & Loveland Traction Company has at last succumbed to the effects of the flood damages in 1915. The receivership of the Cleveland & Chagrin Falls Railway was precipitated by an award of \$50,000 for injuries to a passenger, appeal on which is pending. Serious accidents also figured in the cases of the Southern Cambria Railway and the Hornell Traction Company. The Plymouth & Shelby Traction Company receivership is the result of a court decision holding the company to be a fraudulent corporation.

FORECLOSURE SALES INCREASED

The number of electric railways sold at foreclosure in 1917 was twenty-five, a substantial increase over the nineteen of the year before. The mileage of 737.69 compares with only 430.14 in 1916, and the capitalization figures are considerably larger. The miles of track sold in 1917 were greater than those in any of the preceding eight years. The following adjusted table gives all the comparative figures for the last nine years:

	Number of Companies	Miles of Track	Outstanding Stock	Outstanding Funded Debt
1909.....	21	488.00	\$22,265,700	\$21,174,000
1910.....	22	724.36	19,106,613	26,374,065
1911.....	25	660.72	91,354,800	115,092,750
1912.....	18	267.18	14,197,300	10,685,250
1913.....	17	302.28	15,243,700	19,094,500
1914.....	11	181.26	26,239,700	44,094,241
1915.....	19	308.31	30,508,817	16,759,997
1916.....	19	430.14	13,895,400	22,702,300
1917.....	25	737.69	27,131,900	27,083,045

The detailed foreclosure sales are shown in the accompanying table. As in previous years, some electric railways for which receivers had been appointed or against which foreclosure suits had been brought were able to carry out reorganization plans without the properties being offered at public sale. All the various forms of reorganization, readjustment and change in ownership without formal foreclosure sales were passed over in compiling the table.

The sale of the Mt. Vernon Railway, reported in 1916, was not confirmed, and the property was resold late this year. Furthermore, it should be noted that several properties were sold piecemeal, some parcels in certain cases remaining under the receivership. The Gary & Interurban Railroad, for example, was all sold

ELECTRIC RAILWAY RECEIVERSHIPS IN 1917

	Miles of Track	Out-standing Stock	Outstanding Funded Debt
Bay State Street Railway.....	867.78	\$24,531,500	\$24,345,500
Beech Grove Traction Company	3.90	150,000	100,000
Cincinnati, Milford & Loveland Traction Company	37.00	1,649,425	441,000
Cleveland & Chagrin Falls Railway	12.00	300,000	251,900
Danbury & Bethel Street Railway	16.00	320,000	588,500
Eastern New York Railroad.....	15.00	275,000	150,000
Grafton Light & Power Company	7.00	400,000	300,000
Hornell Traction Company.....	10.90	117,900	150,000
Manhattan & Queens Traction Corporation	22.00	†20,000	None
Minster & Loramie Railway....	3.30	34,100	20,000
Orleans-Kenner Electric Railway	11.60	250,000	250,000
Pennsylvania & Ohio Railway....	26.00	1,300,000	900,000
Pittsburgh & Butler Railway....	33.00	1,750,000	3,688,000
Plymouth & Shelby Traction Company	6.97	200,000	200,000
Richmond & Rappahannock River Railway	25.40	500,000	490,000
Southern Cambria Railway.....	30.00	1,000,000	1,284,500
St. Louis, Lakewood & Grant Park Railway (a).....	4.00	300,000	85,000
Trans-St. Mary's Traction Company	7.52	400,000	150,000
	1,139.37	\$33,497,925	\$33,394,400

†This sum represents installments paid in on subscriptions, there being no capital stock outstanding.
(a) Not in operation since flood of 1915.

in sections. The properties of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, the Sunbury & Susquehanna Railway and the Richmond & Rappahannock River Railway, however, were only partially sold. In such cases the capitalization figures have been prorated on a mileage basis, with full weight given to any underlying liens.

In most cases the foreclosure sales in 1917 were the forerunners to the beginning of business through a reorganized company or a new one. Some properties,

however, went from the sales to the junk pile. These, with the lines whose owners voluntarily abandoned operation, are shown in the accompanying table. An effort was made to segregate actually wrecked companies into two classes, the first, or "Dismantlements," including properties actually scrapped, in process of being scrapped or having the necessary legal sanction for such treatment. The second class, or "Suspensions," includes lines where the service has been discontinued or the question of dismantlement, as far as can be learned, is still pending. No attempt was made to cover the abandonments of small sections of route by operating companies.

The 14-mile parcel of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, purchased by a committee of bondholders in December, was acquired under a court order expressly permitting abandonment if this was desired. It is reported, however, that operation has not yet been discontinued.

Although the Norwood, Canton & Sharon Street Railway was sold in November to a junk dealer, it has not been included in the compilation. The prospective purchaser forfeited his deposit rather than become involved in certain litigation regarding the company, and the property reverted to its owners. Service has not been suspended.

In closing, two instances may well be cited to show how electric railway service is better appreciated when its continuance is threatened. The Cape May, Delaware Bay & Sewell's Point Railway, a 20-mile property, was sold and became headed for dismantlement. The local

ELECTRIC RAILWAY FORECLOSURE SALES IN 1917

	Miles of Track	Out-standing Stock	Outstanding Funded Debt
Algiers Railway & Lighting Company	6.00	\$430,000	\$35,000
Amarillo Street Railway.....	8.20	212,000	125,000
Bluffton, Geneva & Celina Traction Company	19.00	675,000	None
Boise Railroad, Ltd.	8.00	510,400	389,000
Bristol Traction Company.....	15.30	143,800	192,500
Cape May, Delaware Bay & Sewell's Point Railroad.....	20.00	150,000	150,000
Catskill Traction Company.....	5.50	60,000	70,000
Cincinnati, Dayton & Toledo Traction Company	83.90	2,250,000	5,000,000
Cleburne Traction Company.....	8.00	*15,000	None
Columbus, Delaware & Marion Railway	60.00	300,000	2,533,000
Empire United Railways, Inc. (a)	246.22	11,600,000	10,057,900
Gary, Hobart & Eastern Traction Company	9.00	125,000	125,000
Gary & Interurban Railroad...	85.00	4,720,850	2,537,225
Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company (b)	14.00	2,082,750	250,000
Minster & Loramie Railway....	3.30	34,100	20,000
Mt. Vernon (Ohio) Railway....	9.00	10,000	40,000
Nashville - Gallatin Interurban Railway	27.05	750,000	600,000
Pittsburgh & Butler Railway....	33.00	1,750,000	3,688,000
Providence & Fall River Street Railway	10.12	165,000	165,000
Richmond & Rappahannock River Railway (c).....	9.10	179,000	175,420
Sacramento Valley Electric Railroad	12.30	250,000	None
Southwestern Traction Company	15.00	189,000	130,000
Sunbury & Susquehanna Railway (d)	6.00	400,000	560,000
Taunton & Pawtucket Street Railway (e)	17.50	100,000	200,000
Waycross Street & Suburban Railway	7.20	30,000	40,000
	737.69	\$27,131,900	\$27,083,045

*Authorized amount; outstanding amount not ascertainable.

(a) This entry covers the controlled Rochester, Syracuse & Eastern Railroad (as in 1915 Table of Receiverships), although this company was sold separately.

(b) Total trackage, 56 miles, was offered for sale on Dec. 18, but only a 14-mile section was sold.

(c) See 1917 Table of Receiverships. Only the Seven Pines line has been sold.

(d) Remaining mileage, 9 miles, still in hands of receiver. Sold portion represents property of consolidated Northumberland County Traction Company.

(e) Sale covered all mileage of Bristol County Street Railway under old \$200,000 mortgage, held in 1915 to be valid lien assumed by successor, Taunton & Pawtucket Street Railway.

ELECTRIC RAILWAY ABANDONMENTS IN 1917

	Miles of Track	Out-standing Stock	Outstanding Funded Debt
I. DISMANTLEMENTS			
Alton & Jacksonville Railway (a)	21.30	\$142,000	\$450,000
Arkansas Northwestern Railroad	2.13	.....	.....
Gatskill Traction Company.....	5.50	60,000	70,000
City Railway, Mt. Vernon, Ill.	3.25	40,000	None
Cleburne Traction Company (b)	8.00	*15,000	None
Goshen, South Bend & Chicago Railway (c)	20.00	1,109,400	519,900
Mexico Investment & Construction Company (d)	16.00	30,000	11,550
Mt. Vernon (Ohio) Railway....	9.00	10,000	40,000
Norfolk City & Suburban Railway	4.50	50,000	50,000
Norfolk & Ocean View Railway (e)	10.00	62,500	625,000
St. Lawrence International Electric Railroad & Land Company	7.79	250,000	200,000
Sacramento Valley Electric Railroad	12.30	250,000	None
Waycross Street & Suburban Railway	7.20	30,000	40,000
	126.97	\$2,048,900	\$2,006,450
II. SUSPENSIONS			
Amarillo Street Railway.....	8.20	\$212,000	\$125,000
Bluffton, Geneva & Celina Traction Company (f)	19.00	675,000	None
Bristol Traction Company.....	15.30	143,800	192,500
Fort Smith-Oklahoma Light & Traction Company	1.21	30,000	None
Richmond & Chesapeake Bay Railway	14.80	2,500	1,000,000
Southern Traction Company, Inc. (g)	4.50	10,000	24,500
Taunton & Pawtucket Street Railway (h)	17.50	100,000	200,000
	80.51	\$1,173,300	\$1,542,000
	207.48	\$3,222,200	\$3,548,450

*Authorized amount; outstanding amount not ascertainable.

(a) Dismantlement order issued in December by Illinois Public Utilities Commission.

(b) City Council has authorized removal of physical property.

(c) Nineteen miles are being junked now; city of La Porte has option to purchase remaining 1 mile of track and equipment within city.

(d) Actual dismantlement began at end of year.

(e) Six miles of track were taken over by Virginia Railway & Power Company.

(f) Purchaser bought property to dismantle, but work is held up pending hearing before commission.

(g) Sold for dismantlement and work started, but city and county have asked for receiver. Suit is pending.

(h) Sold to wreckers for dismantlement when sale is confirmed. See note in 1917 Table of Foreclosure Sales.

public then made various efforts to secure the operation of the property, even at the hands of the steam lines in the same territory. Nothing was accomplished, however, until the United States Navy Department recently commandeered the railway for government use.

The Providence & Fall River Street Railway, actually sold for junk, was saved from the scrap heap last November. Service was suspended, and the removal of the line was imminent. Public-spirited citizens, however, secured an option and organized a successor company, which took over the property and resumed operation.

Electric Railway Statistics

Figures Are Given by States of the Miles of Track and Number of Cars Owned

THE accompanying table gives statistics of the miles of track and cars of the electric railway companies in the United States, made up from the August, 1917, Electric Railway Directory of the McGraw Hill Company. The dates of the reports in this directory average about June, 1917, so that the table may be considered to represent the statistics of the industry at about that time.

A comparison of the totals given in this table with those in a somewhat similar table, published in the issue of Jan. 6, 1917, will show for all states a total of 1029 companies instead of 1045, a decrease during the year of sixteen. The miles of track total 48,175 as compared with 47,562 in June, 1916, an increase during the year of 613, and the motor passenger cars total 81,383, as compared with 80,058 last year, an increase of 1335. The total number of cars, according to the table, increased from 100,476 to 102,359, or a total of 1883.

The decrease in the number of companies is due in most part to the abandonment of operation by companies which had not found the service financially profitable, although there were a few consolidations. There were also several cases of the splitting up of former consolidated properties by action of the court or for some other reason. Some of the cases of segregation of individual properties brought changes in the mileage credited to different states, because under the plan followed the miles of track and number of cars belonging to each company are credited to the state in which the greater part of the mileage lies. Of the total increase in mileage, more than 25 per cent is accounted for by the increase in rapid transit mileage in New York City. Part of the rest of the increase is probably due to seemingly inevitable discrepancies which occur when reports are made out by different officials each year.

A few other words of explanation are necessary. The electrified mileage of steam railroads is included, but as this is reported to the directory usually as route mileage, that figure is continued in the table, although the mileage of the city and interurban electric railway companies is figured as single track as usual. Under cars, the statistics include only the electric locomotives and the motor passenger cars of electrified steam railroads. Gasoline and storage battery cars are included as passenger motor cars.

Many electric railway companies use the expressions express cars, freight cars, and service cars as interchangeable terms. The table shows the way in which cars of these types are reported by the different com-

TABLE SHOWING STATISTICS OF ELECTRIC RAILWAY COMPANIES IN THE UNITED STATES

	Number of Companies	Miles of Track	Motor Passenger Cars	Trail Passenger Cars	Electric Locomotives	Express or Freight Motor Cars	Freight Cars	Service or Other Cars	Horse or Cable Cars
<i>New England States:</i>									
Connecticut.....	8	1,024	2,269	....	102	....	....	67	....
Maine.....	15	534	540	....	3	3	30	177	....
Massachusetts.....	43	3,243	7,893	357	8	27	33	1,146	....
New Hampshire.....	14	252	286	....	2	1	....	35	2
Rhode Island.....	8	439	1,056	27	....	....	....	246	....
Vermont.....	10	128	141	....	....	....	12	13	....
Total.....	93	6,220	12,185	384	115	31	75	1,684	2
<i>Eastern States:</i>									
Delaware.....	2	153	309	....	....	....	....	81	....
District of Columbia.....	7	412	1,074	....	....	....	....	150	....
Maryland.....	12	674	2,143	....	13	5	70	98	....
New Jersey.....	29	1,545	3,286	3	2	19	4	78	....
New York.....	108	5,037	16,851	1,116	151	12	35	2,000	207
Pennsylvania.....	124	4,579	8,732	15	2	8	75	375	2
Virginia.....	15	590	900	25	....	....	....	173	....
West Virginia.....	24	639	611	....	12	....	5	41	....
Total.....	321	14,229	33,906	1,159	180	44	189	3,826	209
<i>Central States:</i>									
Illinois.....	72	3,774	5,962	696	45	....	962	633	....
Indiana.....	43	2,378	1,920	6	3	11	....	401	....
Iowa.....	25	881	962	13	19	....	....	364	....
Kentucky.....	10	462	965	26	....	12	....	58	....
Michigan.....	26	1,666	2,273	8	20	105	10	472	....
Minnesota.....	14	722	1,329	....	8	....	....	110	....
Missouri.....	22	1,135	2,621	105	....	....	....	285	....
Ohio.....	80	4,280	5,466	68	12	16	24	1,304	....
Wisconsin.....	18	768	975	113	....	....	....	90	....
Total.....	310	16,066	22,503	1,035	110	144	996	3,717	....
<i>Southern States:</i>									
Alabama.....	15	367	444	17	....	....	2	250	....
Arkansas.....	10	128	231	....	....	....	....	44	....
Florida.....	9	183	265	7	....	....	....	53	....
Georgia.....	17	501	699	14	....	....	....	69	2
Louisiana.....	10	327	681	....	....	....	....	140	....
Mississippi.....	11	123	159	2	....	....	....	27	....
North Carolina.....	12	292	303	....	0	....	8	200	....
South Carolina.....	5	120	173	6	....	....	2	16	....
Tennessee.....	15	475	820	....	1	1	2	111	....
Total.....	104	2,516	3,775	46	7	3	12	910	2
<i>Western States:</i>									
Arizona.....	4	54	44	1	....	....	....	1	....
California.....	42	3,293	3,686	82	62	12	403	1,562	119
Colorado.....	13	492	463	16	5	1	143	299	2
Idaho.....	6	180	68	....	2	....	....	18	....
Kansas.....	18	553	415	3	....	....	12	106	3
Montana.....	9	658	128	20	42	32	....	17	....
Nebraska.....	6	254	538	10	1	....	....	65	....
Nevada.....	2	11	12	....	....	....	....	....	....
New Mexico.....	2	9	11	....	....	....	....	....	....
North Dakota.....	6	38	72	....	....	....	....	14	....
Oklahoma.....	16	310	267	....	....	....	....	77	....
Oregon.....	10	679	749	94	25	29	449	218	....
South Dakota.....	3	26	34	2	....	....	....	7	....
Texas.....	38	1,003	1,200	84	....	11	....	223	....
Utah.....	5	470	276	....	7	2	....	311	....
Washington.....	19	1,092	1,049	23	26	16	442	929	48
Wyoming.....	2	22	12	7	....	....	....	3	....
Total.....	201	9,144	9,024	342	170	103	1,449	3,850	172
Total, all States.....	1,029	48,175	81,393	2,966	582	325	2,721	13,987	385

panies, but what is known as a service car on one road may be called a freight car or an express car on another road. In a few cases, where a company owns a large number of freight cars compared with the number of passenger cars owned, the total number of such freight cars has been intentionally omitted from the table. The most notable instances of this are the Chicago Tunnel Company with 3000 "other cars" and the Fort Dodge, Des Moines & Southern Railroad with 2300 "other cars."

The skip-stop plan, which has been in trial use in Buffalo during the past few months, has finally been extended to include most of the routes in that city. The company states that the change has met with almost universal commendation throughout the city, for the service has been speeded up and the number of car stops has been actually reduced 50 per cent.

American Association News

Electric Railway War Board Co-operating with New York Public Service Commission for Second District

Board Issues Bulletin No. 3

New York Fuel Economy Campaign Begins

After Address by C. Loomis Allen of War Board at Conference in Albany Resolutions Are Passed Requesting Commission to Give Consideration to Adoption of Staggered Hours of Labor and Other Means of Conserving Fuel

AS THE result of a conference on Jan. 3 between officials of electric railway lines doing business within the jurisdiction of the Public Service Commission, Second District, held at the Albany offices of the commission, steps have been taken whereunder the consumption of coal by the seventy-two operating electric railways in the State of New York will be greatly diminished. The conference was called by the commission for the purpose of aiding in the nation-wide movement for the conservation of fuel. Chairman Van Santvoord opened the conference with a short address in which he dwelt upon the object of the meeting and touched upon the conditions which make it paramount that everybody should lend a helping hand in the general conservation movement.

C. Loomis Allen, director of the American Electric Railway Association's War Board at Washington, then took the floor. He voiced the warning that unless coal is saved there will be a shortage next year. "The production of coal in this country is at its absolute maximum," he said. "The output of coal during the year 1917 was the greatest in the history of the country. It cannot be increased. Yet this coming year we must add at least 50,000,000 tons to our present output. The only way in which we can provide that is not by production but by economy."

Mr. Allen went on further to state that the electric railways of this country are now annually consuming about 16,000,000 tons of coal and that of this amount they are being asked to save 1,000,000 tons. He then cited five principal methods which had been suggested in connection with an engineering study which had recently been made of the electric railway situation in Washington, D. C., and which, it is believed, will result in the annual saving of 25,790 tons of coal. These measures include the skip or stagger stops, elimination of unnecessary car mileage, reduction of heating in the cars, a gradation of the dismissal hours of employees in large plants and stores, and the operation of both traction systems in that city by means of the same power supply.

At the termination of the hearing a committee was appointed which was intrusted with the task of drafting resolutions. It was directed to make a thorough investigation into the means by which savings in coal can be effected, and to report its findings at the earliest possible date. This committee consisted of:

Charles R. Barnes, chief of the division of electric railways, member ex officio; J. P. Barnes, general manager Schenectady Railway; H. B. Weatherwax, vice-president United Traction Company, Albany; W. H. Collins, general manager Fonda, Johnstown & Gloversville Railway, and J. F. Hamilton, New York State Railways, Rochester.

The following resolutions recommending the steps to be taken by the traction companies within the jurisdiction of the commission in the matter of the saving of fuel were adopted:

Whereas, The national and state fuel administrations, through C. Loomis Allen, director of the American Electric Railway Association War Board, have directed the attention of the Public Service Commission and the electric railroads to the necessity of conserving for war purposes during the year 1918 1,000,000 tons of the annual 16,000,000 tons consumption of coal by electric railways, and

Whereas, Approximately 200,000 tons of coal are used annually by the electric railways of the State of New York under the jurisdiction of the Public Service Commission for the Second District, and

Whereas, It is the unanimous opinion of the state and federal fuel administrations, the War Board of the American Electric Railway Association, as well as of the officials and representatives of the various electric railroad companies in the Second Public Service District that one of the most effective means which can be employed in the conservation of energy as requested by the national and state fuel administrations and one which will cause the least inconvenience in proportion to the results to be obtained, is the "staggering" of hours of labor in industrial plants, the employees of which are patrons of electric railroads, and

Whereas, Under the present arrangement of working hours of these employees it is in most cases an impossibility for the companies to furnish a reasonably adequate service during the hours when they desire to travel, and

Whereas, This is so not only by reason of the limited number of cars which companies can furnish but also by reason of track limitations preventing the operation of the necessary cars, and

Whereas, With the suggested change in hours of service it might be possible to utilize one car to three times its present capacity, and

Whereas, It is believed that the increased convenience to the employees of these plants by the change in working hours would more than offset any inconvenience which might result, and

Whereas, It is further believed that practical results can best be obtained through the co-operative effort of the Second District Public Service Commission and the employers of labor, now, therefore, be it

Resolved, That this conference respectfully request the Public Service Commission to give immediate consideration to the possibilities involved in the above suggestions and to take such action as in its judgment may best promise effective co-operation by industrial enterprises in the various cities within its jurisdiction where the project appears to be especially feasible. And be it

Further Resolved, That this conference assure the Public Service Commission of the hearty co-operation of officials of electric railroad companies in the Second Public Service District in its efforts in this matter. And be it

Further Resolved, That each electric railway in the Second District of the State of New York furnish to the Public Service Commission the names of the industries and the approximate number of employees in each where the "staggered" service would be beneficial and effective.

Trainmen's Pledges Are Subject of War Board's Bulletin No. 3

On Dec. 20, 1917, Fuel Administrator H. A. Garfield addressed to the Electric Railway War Board a letter offering to furnish car cards and window posters for use

**The Motorman
and Conductor
of this Car are
members of the
UNITED STATES
FUEL
ADMINISTRATION
and they are Pledged
to save Electricity
which means
COAL**



War Board American
Electric Railroad Association

CAR WINDOW POSTER FURNISHED BY UNITED STATES FUEL ADMINISTRATION

Uncle Sam Wants Us to Save Coal

The men in the power house are saving every shovelful of coal they can to help our fighters.

The men in the car houses and shops are doing their share, too.

It is up to every motorman to do his part. Every time you handle the controller wrong, or blow your breaker, or spin your wheels (or skid or flatten them), *you* waste the coal the other fellows are trying to save. Every time you keep the current on unnecessarily and then apply the brakes instead of coasting, *you* waste coal.

Be a coal saver, not a coal waster!

It's up to every conductor to back up the motorman in his efforts to save. See that heat and light are not wasted. Handle your passengers and the bell cord so as to help the motorman. This will enable him to handle controller and brakes most economically. Be careful of your passengers and the car equipment.

Encourage each other—co-operate and help.

Each one of us must fight, if we are to win. Your *fight* is to save and co-operate. Your enemy is carelessness and heedlessness.

Get behind our boys, "Over There."

Fare Situation Discussed at New Haven

The meeting of the Connecticut Company section, held on Dec. 20, was largely taken up with statements regarding the pending hearings before the Public Utilities Commission in the matter of higher fares. As allowed under the Connecticut law, the company some weeks ago raised the urban fares on its property to 6 cents, subject to later approval by the commission. The hearings are preparatory to action by the commission. The speakers at the section meeting explained how the data had been prepared for consideration by the commission, and some of the data were cited by way of illustration.

W. J. Flickinzer read the statement which had been presented at the hearing by President L. S. Storrs outlining the causes which had led the company to increase the flat fare to six cents rather than to secure the increase by some other method of fare modification. Mr. Flickinzer also presented to the section a résumé of the

circumstances which had led to the formation of the Electric Railway War Board and explained briefly its organization.

Mr. Storrs then gave a picture of the state of the electric railway industry which, while at present discouraging in a way, is at the same time promising. He felt increasingly optimistic regarding the outlook.

The meeting, as usual, was preceded by a dinner, enlivened with orchestral music and singing. The annual election was held also, resulting in the following selections: President, W. P. Bristol, manager Hartford division; vice-president, W. R. Dunham, Jr.; engineer maintenance of way; secretary, W. E. Jones, statistician; treasurer, George M. Cresson, treasurer's office; director for three years, J. M. Hamilton, general agent New Haven division. The section decided to make a feature of the question-box plan in connection with the meeting programs. The membership committee reported a present membership of 249, including eighteen members now with the colors, a slight increase for the year in spite of difficulties incident to the war. W. E. Jones, secretary, stated that the honor roll of the company contains 214 names at present, the total number of employees being roughly 4,000.

Operating Costs Discussed in Portland

G. Sabin Brush, superintendent of the railway department, was the speaker at the meeting of the Cumberland County Power & Light Company section held on Dec. 17. Mr. Brush discussed the circumstances of the company at the present time relative to the high costs of operation. He used charts to compare present prices with those of five years ago and also to show the various items of expense. Judge William Lyons, one of the guests, responded to a request for a short talk and spoke on the war.

A notice was read at the meeting of a correspondence course in practical electricity which is being started in the power and light departments. The meeting was preceded by a dinner from 6 to 8 o'clock, and during the evening the section orchestra rendered several selections, supplemented by piano and cornet solos.

Turkey Raffle at Chicago Meeting

G. H. Pierce, of the electrical department, held the lucky number entitling him to a live 12-lb. turkey at the meeting of the Chicago Elevated Railroads' section on Dec. 18. About 100 members and guests listened to an instructive program, after which they gathered around the refreshment table where apples, doughnuts and cider were served. The service flag of the Elevated roads was displayed for the first time, showing a total of 291 men to be in government service. Recitations and a piano solo constituted the entertainment.

The serious part of the program consisted of a talk on "Accounting," by T. B. MacRae, auditor, and a brief summary of the results already obtained in the use of coasting clocks, by H. A. Johnson, superintendent of shops and equipment. Following Mr. Johnson's talk, A. H. Daus, assistant superintendent of shops and equipment, replied to the inquiry: "Could not the heat generated in motor-starting resistance be utilized for heating motor cars?" This gave rise to a brief discussion, from which it appeared that the question deserved further study.

LETTER TO THE EDITOR

Captain Gonzenbach Favors Light Cars

SOMEWHERE IN FRANCE, Dec. 15, 1917.

TO THE EDITORS:

Way over here in France I have come across copies of the *ELECTRIC RAILWAY JOURNAL*. I found them in the tent of one of our officers. The contents are interesting reading to me, and strange, too. It looks as if the electric railway industry in the States is hitching up its trousers and rolling up its sleeves for a new grip on itself. It seems mighty good to see "the paper" full of arguments for light cars, one-man operation and re-engineering, to one who has for years argued these points till he was blue in the face.

Some of the same engineers who are now strong for all these things did not hesitate a few years ago to brand any one a "crank" who dared to prefer the dinky light cars of our early years to the young Pullmans we so fondly and blithely ordered from the always obliging car builders; and I would mention some boards of directors who smiled tolerantly when some non-conformist manager or engineer impudently suggested dumping the juggernauts on the scrap heap and starting all over again. That would have required lots of new capital, and still does, but I suspect that the money could more easily have been raised a few years ago than under present conditions of the money market, and particularly the public-utility market. Ho-hum, the world do move!

I am sitting in a tent and can hear the guns exchanging hate as I write.

ERNEST GONZENBACH,
Captain, E. O. R. C.

Some Efforts in the Line of Conservation

Coal Shortage Is Stimulating Service Economies—
Reports from Several Sections of the
Country Are Given

THE conservation movement is gaining headway as indicated by the activities of railway managers in all parts of the country. A few of the most significant occurrences of the past few days are summarized below:

FUEL ECONOMY COMMITTEE APPOINTED IN INDIANA

Evans Woollen, federal fuel administrator for the State of Indiana, has appointed C. L. Henry, president Indianapolis & Cincinnati Traction Company; Robert I. Todd, president Terre Haute, Indianapolis & Eastern Traction Company; S. W. Greenland, general manager Fort Wayne & Northern Indiana Traction Company; C. N. Wilcoxon, president Chicago, Lake Shore & South Bend Railway, and F. J. Haas, general manager Evansville Public Utilities Company, as a committee on fuel economy by electric railways.

This committee held a meeting with Mr. Woollen on Dec. 28 to discuss ways and means of effecting fuel economy within the State. At a later meeting Mr. Henry was appointed chairman, and H. H. Lloyd, Terre Haute, Indianapolis & Eastern Traction Company, was named as secretary. Suggestions were made to the

fuel administrator as to several questions which should be considered in fuel economy, such as the adoption of the skip stop, the elimination of all cars and trains unnecessary for public convenience, economy in the heating and lighting of cars and stations; the shutting down of the smaller, uneconomically operated power stations, current to be supplied from the larger generating stations.

OHIO INTERURBAN RAILWAYS ARE SUSPENDING "LIMITED" SERVICE

Interurban railways entering Cleveland, Ohio, are preparing to reduce passenger service by the suspension of as many limited cars as possible. It has been predicted that this will take place on all railways in the State, as the government has requested curtailment of service as a means of conserving coal. Limited cars are classed as luxuries and the government authorities expect traveling to be done on the local cars. Limited cars between Cleveland and Wooster on the Cleveland, Southwestern & Columbus were taken off on Dec. 28. The service between Cleveland and Bucyrus will not be changed for the present. On Jan. 1 all but two limited cars were taken off the Cleveland, Painesville & Eastern, five cars being taken out of service.

Several limited cars have been taken off the Lake Shore Electric also, but the important through service to Toledo and Detroit will be continued.

ECONOMIES AT ST. LOUIS AND EAST ST. LOUIS

In response to requests received by the United Railways asking that conservation measures be enforced President McCulloch stated as follows: "We are making every effort to comply with the request of the government but are not able to save much coal at present. We are trying to eliminate waste by keeping the boilers in the power houses perfectly clean, etc. The supply of coal used in the cars has not been cut down. We are also trying to refrain from buying any but necessary supplies. This part of the conservation program has been easier for us to follow and already we have made a noticeable difference in the amount of material shipped to us."

Last week D. E. Parsons, general manager East St. Louis & Suburban Railway, announced that cars would be taken off some lines and the heating of the cars would be reduced. Service will probably be reduced on the State Street and Cleveland Avenue lines. Stockyards cars will not be run over the Eads Bridge to St. Louis and the lone car of the Jones' Park line will no longer be operated. The Stockyards cars will be run to Third Street and Broadway. Transfers will be issued good on cars going over the river.

I. T. S. CONSIDERING INCREASED HEADWAY

The Illinois Traction System may annul certain trains on a number of divisions of the road. A two-hour headway at certain hours of the day instead of hourly service is under consideration. Some of the early morning cars could also be dispensed with as they are poorly patronized, especially in certain seasons of the year.

The Chicago (Ill.) Surface Lines service flag contains 542 stars. It was hung out of the window of President Busby's office on Christmas day for the first time.

CONSTRUCTION, MAINTENANCE AND EQUIPMENT

Engineers, Master Mechanics and Others Who Have Developed Economical Practices, or Who Have Worth-While Ideas Are Invited to Tell Readers of the Journal About Them in This Department

Dispatching Trucks and Work Trains

New York State Railways Have Developed a Simple but Effective Plan for Increasing Useful Mileage

BY C. L. CADLE

Chief Engineer New York State Railways, Rochester Lines

THE same principles that are effective and necessary in train and power load dispatching can be applied also to the assignment of duty to truck and work train crews. The way in which this work is handled by the New York State Railways, Rochester lines, is as follows:

The writer is responsible for the proper utilization of all repair trucks and work trains on the Rochester lines, and deputizes to a special telephone operator the authority necessary for the dispatching work in detail. This operator does not devote all of his time to dis-

These are used for routine repair work and are called upon to cover all emergency conditions, such as "trolley wires down," "cars off the track," "vehicles blocking traffic," etc. In addition, there are four service trucks engaged in the other duties mentioned above. All of these come under the dispatcher's authority, as well as two or three, and sometimes four, work trains.

For emergency operation the line trucks are called through the telephones which the company has placed at a number of important points, and we also take advantage of the friendliness of the public. When a truck goes out in the morning the crew advises the dispatcher of its prospective location. As soon as it arrives there, if there is not a company telephone in reach, the driver arranges with the proprietor of a near-by store to call him to the telephone in case the dispatcher wants him. Seldom is a merchant unwilling to accommodate us in

[illegible]

PART OF FORM USED IN RECORDING TRUCK AND WORK TRAIN MOVEMENTS. ACTUAL SIZE OF SHEET, 31 IN. WIDE, 12 IN. LONG.
REPRODUCTION IS ABOUT TWO-FIFTHS SIZE

patching, but he makes this his first duty and familiarizes himself with the whereabouts of all transporting equipment for which he is responsible. The dispatcher's task is to see that supplies are delivered when and where needed, that freight is promptly removed from railroad stations or delivered thereto, that rubbish is removed from streets at the proper time, etc. This involves a general knowledge of the requirements of all departments having materials to be moved.

Each day the dispatcher gets from the roadmaster and the paving foreman lists of materials which will be needed, and where and when these are to be placed. The purchasing department furnishes him with the facts regarding freight at the railroad stations. The building department also specifies its requirements. With all of this information before him the dispatcher makes out a program for the day. He notifies each crew where it is to begin work and from what point he shall be called for further instructions. Each evening provision is made for moving work gangs to new jobs so that they will know where to report in the morning.

The company has four line trucks assigned regularly to cover respectively four sections of the city.

this respect. The driver notifies the dispatcher of the merchant's telephone number. In an emergency the latter calls two trucks at once by means of those numbers, or on the company's telephones, the first one answering being sent to the seat of trouble and the other being told to continue working.

All movements of trucks and trains are recorded on a large form which is constantly spread before the dispatcher. A part of this is reproduced herewith. Thus a complete record is made almost automatically, which in itself is an important part of the scheme. This record furnishes a commentary upon the autographic mileage records made by the trucks and also furnishes data for settling disputes as to performance.

Experience at Rochester with the central control scheme has shown that it is quite possible to secure co-operation once its advantages are understood. Tact and patience are virtues required by the dispatcher, but it is easy to convince the men that their interests are being safeguarded rather than their rights invaded by the plan. The dispatcher is especially effective in sending trucks to the spot for emergency repairs, for he knows where all of them are at any moment and, in a pinch, can send to any point the first truck which he can reach regardless of its natural district boundaries.

Asphalt Plant Used Also for Car Sand Drying to Gain All-Year Use

Installation of Asphalt Mixer Saves Considerable Expense on Both Asphalt and Sand Handling—Labor Saved Will Pay for Plant the First Year

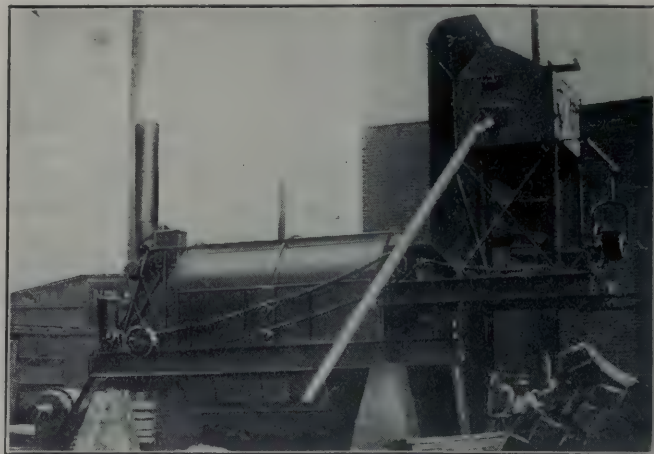
BY A. E. HARVEY

Superintendent of Way and Structures Kansas City (Mo.) Railways

BY working out a scheme for utilizing an asphalt mixer plant as a car sand dryer during the winter months and in non-construction periods in the summer, and thus keeping the investment working profitably practically all the year, we have been able to justify the expenditure for installing a Hetherington & Berner asphalt plant in our Southwest Boulevard material yard. An arrangement of the plant to allow the use of hoisting machines already in service in the storage yard in conjunction with the plant has also contributed materially to producing such savings in the provision of both sand and asphalt as practically to pay for the plant the first year. Our average requirements are about 5000 sq. yd. of asphalt per month during the summer, and 20,000 cu. yd. of sand per year for use in the cars. Where twenty-five men were formerly required to prepare our asphalt when panning it by hand we are now able to handle this work with five men. A noticeable labor saving in connection with the sand drying has also been realized, since we formerly dried the sand in stoves at the division carhouses, and some of it in the asphalt pans at the storage yard.

A compact arrangement of asphalt plant, derrick and sand bins has made it possible to run all materials through the asphalt plant without handling any of them by hand, except for the rolling of the asphalt cans up over the heating kettles. These kettles, as well as the revolving cylinders in which the sand and grit for mixture with the asphalt are heated, are fired with oil sprayed through the burners by means of steam from a small boiler. The entire plant is motor-driven. After being properly heated in the kettles, the asphalt is pumped out of these receptacles up into a receiving bucket hung on a monorail, which extends over the mixer. A motor-driven centrifugal pump is used for this purpose and the asphalt is constantly circulated through steam-jacketed piping and a by-pass valve at the outlet to the bucket, so that it will not become congealed. The sand and grit for the mix is taken from a pile at the rear of the machine and carried by means of a bucket conveyor up into the revolving cylinders concealed under the large drum hood seen in the picture. After being heated sufficiently here the sand is elevated from the dump from these cylinders by means of another bucket conveyor up into the screen chamber, where it is separated into two sizes and discharged into the sand hoppers beneath. From these it is drawn by gravity into the mixer in measured quantities, while the asphalt is poured into the mixer simultaneously from the bucket on the monorail seen at the front of the plant. After suitable mixing the paving material is discharged by gravity into wagons below.

When using the plant as a sand dryer for car use, the sand passes through the plant in the same manner as in preparing paving material except that it is discharged from the sand bunkers by gravity into sand



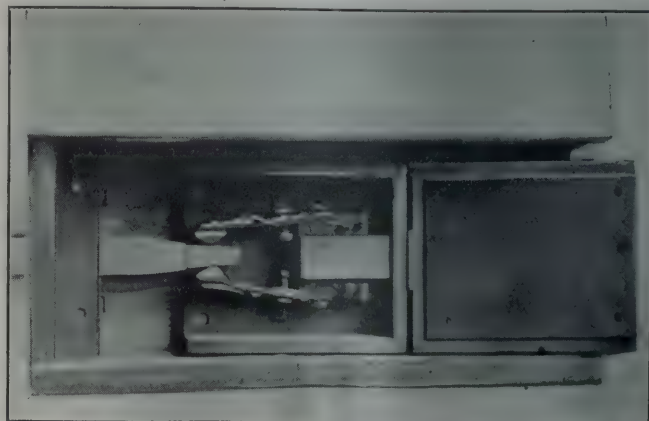
KANSAS CITY RAILWAYS ASPHALT MIXING AND SAND DRYING PLANT

bins conveniently located, instead of into the mixer. All sand for both purposes is unloaded from the cars in which it is brought to the yard by means of a grab bucket and motor-driven stiff-leg derrick adjacent to the plant. This derrick is also used for various other purposes in the yard, so that it is kept in service a large part of the time. The capacity of the asphalt plant when drying sand for use in the cars is about 100 cu. yd. a day. This amount is in excess of the needs of the railway, so that an accumulation of sand is readily obtained, making it possible to utilize the plant for the purpose for which it was originally designed without causing a shortage of sand for car use. The storage bins are so located that the sand may be handled entirely by mechanical means from the cars in which it arrives at the yard, through the plant, and from the storage bins into the work cars for distribution to the various division carhouses.

The asphalt plant, without the derrick, which was already a part of the yard equipment, was installed in the yard on concrete piers at a cost of approximately \$10,000. The saving in labor the first year will practically pay for the plant.

Electrical Interlock for Use with Folding Car Steps

A NUMBER of cars of the International Railway in Buffalo, N. Y., have been fitted with a home-made electrical interlock like that shown in the accompanying photograph. It consists of a pair of standard



ELECTRICAL INTERLOCK FOR USE WITH FOLDING STEP

controller fingers supported on brass blocks which in turn are mounted on a block of wood. The brass blocks form the terminals of a loop from the resistor circuit of the control system. Brass stops are mounted as shown to permit adjustment of the spring tension by means of the set screws. The contact fingers are bridged by means of a brass, wedge-shaped contact block mounted on the end of a wooden rod which is retracted whenever the step is down.

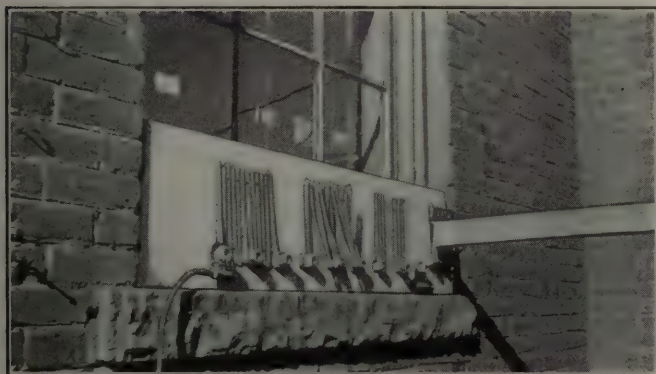
The contactor is inclosed in a wooden box, 8 in. long and 7 in. wide, lined with asbestos board. This is surrounded by another box 20 in. long, 9½ in. wide, 5½ in. deep, with cover, in one end of which is the guide for the step rod.

Reclaiming Warped Resistance Grids

BY W. H. MCALONEY

Superintendent of Rolling Stock Denver (Col.) Tramway

MANY resistance grids which are broken or badly warped can be reclaimed to make savings which represent quite a considerable proportion of the cost of new grids. On our system the broken grids are reclaimed by welding, which is a rather simple process. We have also devised a scheme for reclaiming warped grids by heating them with current and holding them in proper position while they cool.



SCHEME FOR HOLDING GRIDS IN SHAPE WHILE COOLING

The rig fixed up for doing this work is shown in the accompanying illustration. A piece of ½-in. transite board, 13 in. wide and 48 in. long, reinforced on the back with a ¼-in. iron plate, is equipped with ¾-in. bolts properly spaced so that three grids can be bolted on the board at one time. The proper spacing between adjacent segments of the grids is maintained by inserting No. 8-32 machine screws as spacers. These project through the transite and into a ½-in. fiber strip on the back, which is used in order to make the threads hold.

An arm made of ½-in. x 3-in. transite, 36 in. long, is hinged at one end of the board and clamped down at the other, thereby holding the grids firmly against the board. Electrical connection is made by means of copper connecting strips on the back of the board. A current of about 250 amp. is maintained for approximately thirty seconds through the three grids in series. This brings the grids to a red heat, and as they are held firmly in position while they cool off they remain permanently in a plane.

In the illustration, the middle grid is warped, typical of the condition before reclaiming, while the one at the

left shows the result of this reclaiming process. The cost of doing this work, including energy and labor, amounts to only 3 or 4 cents, as against a present net cost of 14 cents to 28 cents for a new grid, depending on the size.

Developments in Electrical Apparatus During 1917

Development Work Has Suffered Owing to Congestion of Orders for Standard Apparatus

THE Westinghouse Electric & Manufacturing Company has prepared a comprehensive review of the manufacturing and engineering situation in this field during the last year. From this review the following paragraphs have been abstracted.

POWER GENERATION AND DISTRIBUTION

The demand for underfeed stokers has been greater than was anticipated, most of the stokers for new plants being for use with relatively large boiler units. The 1200-hp. to 1400-hp. sizes are popular. In a plant at Windsor, W. Va., which will be described in a later issue of the *ELECTRIC RAILWAY JOURNAL*, stokers of this type have been installed to evaporate 100,000 lb. of water each per hour from 100 deg. feed-water temperature to steam at 250 lb. gage pressure, superheated to 250 deg. For two hours these stokers can cause an evaporation of 120,000 lb. per hour. The company finds a demand for the Roney stokers which is still ahead of available production. Most of these, however, are for small industrial plants.

In generating equipment the most notable feature has been the increasing use of hydroelectric power, stimulated by the high cost of coal. During the year the Montana Power Company has installed four 12,000-kva. vertical units at Holter, Mont., very largely to supply power for the Chicago, Milwaukee & St. Paul electrification. The high cost of materials, labor, etc., has also stimulated the use of synchronous condensers for power factor correction and voltage regulation. This it has done because the installation of such apparatus saves an increase in transmission line copper, or allows additional load to be taken on a given line.

The outstanding feature of the switchboard business has been the continued purchase of switch gear of great initial and ultimate capacity. A number of 150,000-volt outdoor oil circuit breakers of rupturing capacity far in advance of anything heretofore within the limits of high-voltage breakers have been completed. These breakers have round instead of elliptical tanks, domed instead of almost flat tops, and are of rolled steel construction.

Among other developments worthy of mention are the frame-mounted, indoor and outdoor high-powered steel tub 73,000-volt breaker, the combination 37,500-volt and 132,000-volt outdoor single-pole disconnecting switches and choke coils all on a common base, and the 66,000-volt post-type bus supports and disconnecting switches. There has also been developed a very compact drum type of circuit breaker controller. A number of outdoor switch houses have been installed to control circuits up to 6600 and 11,000 volts, a considerable increase in voltage over previous practice. The Westinghouse Company has also developed a control equipment for automatic rotary converter substations.

For the protection of apparatus on railway cars further developments have been made in the use of condensers by surrounding them with molded insulating cases impervious to moisture. The capacity has been increased to 1 microfarad in all forms of arresters (for pole mounting as well as car mounting) giving a static discharge capacity said to be sufficient to take care of the worst conditions found in practice.

During the year the company has added to its line of motors a new type, No. 577, having a rating of 200 hp. at 600 volts. This motor is especially suited for heavy subway service and is a striking contrast to the "Wee" motor. The H.S. and H.S.D. types of control have been combined into a one-piece outfit for economy of space and simplicity of wiring and mounting.

Regeneration has been extended to ordinary inter-urban applications, especially in locomotive service, and it is expected that this development will rapidly expand.

STEAM RAILROAD ELECTRIFICATION

The past year has seen considerable detail development and improvement in apparatus pertaining to electrification of steam railroads. The company has developed a very powerful split-phase locomotive which weighs 250 tons complete, has a horsepower capacity of 4800 and a maximum tractive effort of 130,000 lb., all concentrated in one single cab unit. The locomotive contains a synchronous phase converter by means of which 100 per cent power factor can be obtained. This eliminates some of the line losses encountered with the induction type of phase converters.

The high-voltage direct-current system has also received attention and a high-powered passenger locomotive was designed. This will be rated at 4000 hp. and the starting tractive effort will be 112,000 lb. The total weight will be 266 tons. This engine will also be a single cab unit.

Cooling Water for Power Plant Purposes*

New Type of Adjustable Spray Head—Nozzles Should Be Kept as Low as Possible—Efficiency Increases with Increase in Pressure and Decrease in Capacity

EXPERIMENTS to ascertain the conditions governing the cooling of water by means of spray ponds, involving the efficiency of the cooling process under varying conditions of pressure at the spray nozzles, temperature of water to be cooled, power applied to the pump, and height of sprays above the pond, have been conducted by the department of engineering of The Johns Hopkins University. The pond used was 35 ft. in diameter and 4 ft. deep and the water was ordinarily sprayed through one spray head, or nozzle. A motor-driven centrifugal pump with 4-in. suction and discharge was used to send the water through the condenser tube to the spray head. The pressure of the spray head was in all cases measured by means of a mercury column connected to the entrance of the spraying device. Wind velocity was measured on a standard anemometer and the humidity by means of a wet-and-

dry-bulb sling psychrometer. The amount of water circulated was measured over a 10-in. weir, fitted with a micrometer hook gage. About 600 tests were made.

The adjustable spray head used in most of the tests consisted of a cast-iron supporting base containing the water-entry opening, and carrying a 3¼-in. outside diameter bronze tube in which was cut a spiral opening of coarse pitch. This opening was cut with a tool placed at an angle of about 60 deg., with the axis of the tube so that the water was thrown up at this angle. The spiral tube was held between the base and a cap which fitted the top by means of a central bronze stem. This passed down to a close clearance bushing in the base. The stem was movable and operated through a bell-crank and an extended vertical arm, giving accurate control of the position of the stem. The result of the motion was to either increase or decrease the fineness of the film of water as it left the spray head. When the head was in operation, the water was discharged in a continuous sheet in a direction which inclined upward, due to the angle of the spiral opening. As the water film spread, it became thinner on account of its increase in diameter until a point was reached where the surface tension was overcome, and the sheet of water broke into a uniformly fine spray, a mist or a large number of small drops, depending upon the size of opening to which the spray had been adjusted. This principle of spraying a liquid as a result of the spreading of a film of water until it breaks into mists, or spray, or fine drops, is particularly applicable to low-pressure work. The pressures used in the experiments described are relatively low, being in general from 5 in. to 8 in. of mercury.

It was desired to ascertain, among other things, the effect of placing a wire fly-screen cylinder about the spray head, and many of the tests were so made. Under some conditions this screen seemed to improve the efficiency, but in general it was not found to be necessary.

The efficiency of a cooling pond or tower may be expressed as a ratio between the cooling actually produced and that which would have resulted from cooling the water down to the dew-point or wet-bulb temperature. A perfect spray cooling device would be one capable of subdividing the water so that evaporation would take place at the dew-point and to an extent such as to lower the pressure of the remaining liquid spray to that temperature.

Experiments were made at three initial temperatures, namely, 98, 105 and 125 deg. Fahr., adjusting the spray head to suit the weather conditions. The results show that the efficiency increases with an increase in pressure, and with a decrease in capacity, and that the increase in efficiency is slightly less for temperatures of 105 and 125 deg. than for a temperature of 98 deg.

Tests made to obtain the efficiencies with water falling upon the bare cement bottom of the pond as compared with those resulting when the pond contained its normal amount of water were rather surprising in their results, showing efficiencies of from 15 to 20 per cent less for the former. If a bare pond would serve as well as one containing water, the construction of the pond could be cheapened since less weight would come upon the foundation and less material would be required for the pond as a whole.

The average evaporation may probably be taken at about 2¼ per cent. This will, of course, vary with

*Abstract of paper delivered before annual meeting of American Society of Mechanical Engineers, by Carl C. Thomas.

weather conditions, initial temperature of water, pressure at the nozzle, and humidity. A large number of tests made with water at high and low initial temperatures indicated that 2 to 2½ per cent per hour represents fairly well the average loss of water, but that it may be as low as one-half of 1 per cent and in windy weather as high as 10 per cent.

The power required to circulate the water was determined by experiments made on a 40-ft. x 60-ft. pond equipped with two sets of nozzles. One set consisted of forty-two non-adjustable, spiral-core nozzles and the other set of twelve adjustable spray heads. The power appears to be practically independent of the type of spraying device used. The cooling seems to be principally dependent upon the energy put into forcing the water through some suitable spraying device, and, given the requisite energy, a great variety of forms of nozzles would yield about equally good results. The adjustable spray head has many operating advantages, some of which are the ease with which the heads can be kept clean, and the possibility of regulation of the spray to suit weather conditions and to minimize loss of water in windy weather. Each head will handle from 150 to 250 gal. per minute, making the cost of piping small, and will take care of the condensing water for a 50 to 75-kw. plant.

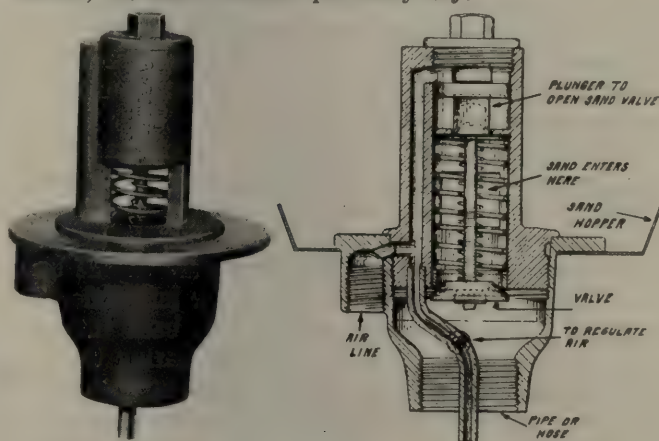
The height of spray nozzles above the surface of the pond has an important effect upon the cooling of the water. Experiments made in a small pond and in three larger installations have shown that the nozzles should be kept as low as possible. In the experimental pond heights from 8 ft. down to 3 ft. have been used and in larger ponds from 6 ft. down to 3 ft. A loss of several degrees results from placing the nozzle high above the pond due to the fact that a given pump placed in a certain relation to the surface of the pond will deliver a smaller amount of water to a high level than to a low level, and this smaller amount will leave the condenser at a higher temperature than would the larger amount of water. Also, with a given amount of power at the pump, less energy will be available for breaking up the water if the nozzle is placed high than if it is placed low, and it appears that minute subdivision of the water is more important than is a long path through the air.

With a given adjustable spray head, as the spiral opening is made wider the degree of atomization and resulting cooling are reduced. This is advantageous in that in windy weather very good cooling can be obtained when spraying a very large amount of water per nozzle and loss of water due to windage can thus be greatly reduced. Very good cooling effects are frequently obtained in very humid and even in rainy weather. Also the cooling effect seems to bear no direct relation to humidity, but to depend largely upon conduction of heat from the air, and it varies directly with the fineness of subdivision of the water particles.

The New York State Railways, Syracuse, N. Y., is rearranging the lighting on fifteen of its interurban cars, a row of ten 94-watt tungsten lamps being placed along the center line of the ceiling, seven lamps in the main compartment and three in the smoking compartment. The result is a very satisfactory distribution of light. On the platforms 23-watt Mazda lamps will be used in series with the gage lamps.

New Sander Designed to Prevent Causes of Stoppage

THE effect of atmospheric conditions upon track sand, one of the common causes of stoppage in sanders, has been overcome in the Reliance sander produced by Holden & White, Inc., Chicago, by placing a valve at the bottom of the sand chamber to prevent contact of the atmosphere with the sand. This sander is installed in the usual manner at the bottom of the sand hopper and is operated by the motorman with the ordinary sander valve. With this device, when air is admitted a small plunger is forced downward, opening a valve at the base of the sand chamber and allowing the sand to drop by gravity into the pipe leading to the track. Air is admitted simultaneously to the main pipe or hose, serving to force the sand to the track. As air pressure is not applied directly to the sand in the sand chamber, there is no tendency to produce a sand blast, and since contact with the air and atmosphere is prevented, the sand remains perfectly dry.



SANDER DESIGNED TO PREVENT EFFECT OF AIR IN CAUSING SAND TO CLOG

The Reliance sander is designed to deliver any amount of sand up to 22 lb. per minute, and it is claimed it will force the sand around bends in the pipe. Installations of the device have been made by the Chicago, North Shore & Milwaukee Railroad, the Michigan Railway, the Milwaukee Electric Railway & Light Company, the Chicago & West Towns and other railways, and from the experience of these roads it is understood that it has proved satisfactory in handling wet sand and that no trouble has been had from clogging. The sander is made of bronze and malleable iron, and weighs 2 lb. It is easy to install and can be used on a car where the sand hopper is not placed over the wheels.

Storage Rack for Wooden Car-Repair Parts

IN the shops of the New York State Railways, Syracuse, N. Y., a series of wall racks have been installed in the erecting shop for the storage of standard wooden pieces required in car repairs.

This procedure has resulted in great saving of time in making such repairs, as the foreman is able to determine at a glance whether a reasonable stock of each piece is on hand and thus keep the stock up to requirements. Proper labeling of the sections of the racks makes possible the selection of the proper piece for a given repair on any type of car by workmen who may

be unfamiliar with the details of the car construction. The racks are arranged for vertical storage of pieces to economize space and prevent warping.

Retaining a Record of Transfers

Adaptation of Cash Fare Receipt Box to Transfers Gives Very Simple and Inexpensive System of Checking Back—Large Part of Waste Eliminated

THE Macdonald Ticket & Ticket Box Company, Cleveland, Ohio, has brought out an adaptation of its well-known cash fare receipt box for use in issuing transfers on city lines. The arrangement consists of one of the standard holders in which the printed transfer slips are inserted and which is equipped with five movable pointers determining the hour, minute, day of the week, week of the month and whether issued in the morning or afternoon. On the printed transfer are included the name of the company at the top, a space in which special conditions of transfer may be printed, the name of the car line from which the transfer is issued and the name of the month. A serial number in red is also printed on each transfer.

In issuing transfers the conductor simply has to set the pointers and tear off the printed slip. This leaves a stub giving a duplicate record of the transfer issued, which is retained in the folder and turned in by trips at the end of the run. A slight pressure on the back of the holder draws the points of paper left under the pointers when a transfer is torn off, back into the holder, thus retaining the record and clearing the cutters for the next transfer. Since the hour pointer is moved but once an hour, the day-of-the-week pointer but once a day, and the week-of-the-month pointer but once a week, it leaves only the minute pointer as an active one which the conductor must watch.

It is claimed that this form of transfer prevents illegal transfer sale or "trading," since the time indicated on the audit stub retained in the holder must correspond to the running schedule time. In order either to sell or trade transfers, it is necessary to date the transfer issued in advance, and, of course, if the stubs or transfers issued were all in advance of the regular schedule time, it would give ample evidence of manipulation.

Another advantage claimed for the transfer is that all the information which the receiving conductor requires is to be found in a single line on the left edge of the paper. In view of the fact that the device has but one really active pointer, it is said that it may be

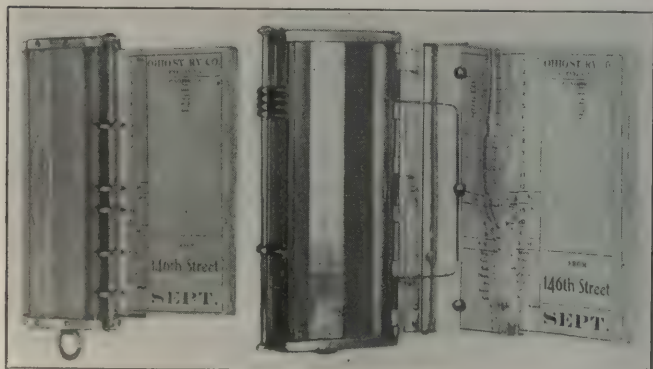


SIMPLE OPERATION FOR CONDUCTOR TO ISSUE
DUPLEX TRANSFERS

operated with a speed equal to a one-punch transfer. With transfers which have the date printed on, the wastage is naturally considerable on account of the impossibility of estimating closely the requirements of any particular day. Under this Macdonald scheme only the month is printed in, thus saving a large part of the wastage, since it is possible to estimate much more closely the requirements throughout a month than the daily consumption. This scheme also eliminates the loss where transfers have only the day of the month printed and the unused transfers are returned for use the corresponding date on the next month, thus involving a cost of filing and a loss due to passengers retaining their unused transfers for thirty, sixty or ninety days, or until such time as they can be used.

The principal value of this system of transfers, however, lies in the possibility it gives to the auditing department to check up on a suspected conductor's work at a cost only a small part of that involved in checking under ordinary systems. For example, under present conditions it is usually necessary to gather all the transfers collected and returned for the day. Then the opening and closing numbers for the particular conductor are noted and a search begins. Each transfer issued by this conductor must be segregated, and then filed in numerical order. Then those issued for each trip must again be segregated and the punch marks checked against the running schedule time. In an average city where the number of transfers turned in in a day is around 100,000, it is easily appreciated what magnitude there is to this task, which, of course, multiplies rapidly as the size of the city increases.

Under this record-retaining system of transfers, it is not necessary to segregate the passengers' portions of the transfers, as these are only a duplicate of the audit stubs returned after each trip by the conductors. Thus it is only necessary to collect together the turn-ins from the various trips of the conductor in question for each day to make a complete check. The simplicity of this work practically eliminates the excessive cost of segregation which has prevailed on most properties when it was desired to make a check on the misuse of transfers, thereby making it possible to conduct a much more thorough supervision of the daily income than is now practicable.



TRANSFER BOX AS IT APPEARS IN USE AND OPENED UP

Spokane Line Car Has Air-Operated Tower

AN air-operated tower is the feature of the line car operated by the Washington Water Power Company, Spokane, Wash. The raising and lowering mechanism is actuated by an air cylinder, 10 in. in diameter and 7 ft. long, which receives its pressure directly from the air-brake system through control valves located in both ends of the car. The cylinder has by-pass ports to prevent the tower from being raised to too great a



WASHINGTON WATER POWER COMPANY'S LINE CAR WITH AIR-OPERATED TOWER

height. The air pressure will hold the tower with two men working on it for twenty minutes, but chains are used to take the weight off the cylinder if a longer job is to be done.

The working platform of the tower is 14 ft. x 4 ft., and is mounted on roller bearings so that it can be swung around by one man. The roof of the car is decked over with ½-in. planks to form an additional platform so that the crew can work from any point on the car.

More Brains Needed in the Boiler Room

IN response to a request from the Bureau of Mines to a number of prominent fuel engineers for suggestions on coal conservation, Martin A. Rooney of Detroit, Mich., said among other things:

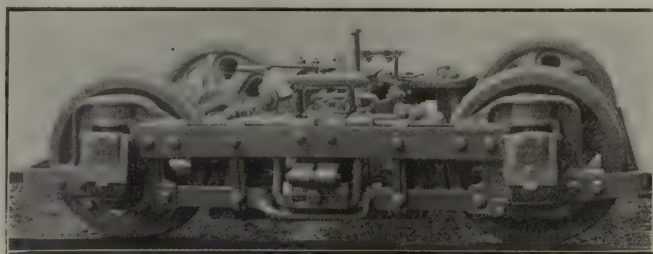
"At best one-fifth of all of our coal is wasted, and it is shamelessly and needlessly wasted. Instruments and machinery for getting out all the heat that there is in the coal are not nearly so complicated or expensive as the cash register used to keep tab on cash receipts in a store, or as the motor truck. Carbon dioxide, temperature and draft are subjects easier to comprehend than bank discount or freight rates.

"The time is coming when the government is going to limit the supply of coal, and fuel will be denied to those who cannot show that it is going to be used efficiently. Let the government show the patriotic coal user how to conserve this most important material. Let us send into our furnace and boiler rooms men who can show our engineers and firemen how to burn their fuel with the least waste, as we have sent them among our fields and orchards to show the farmer how to increase the productivity of the soil."

New Reduced-Height Truck for Low Level Cars

TO meet the growing demand for a truck suitable to be used with the latest types of extremely low level cars, either center- or end-entrance, the Taylor Electric Truck Company, Troy, N. Y., is building a new lightweight truck which has several features especially to commend it for such service. The new truck, called the Taylor R. H. (reduced height) truck, is built along lines similar to the company's L. B. truck and is designed to receive the inside-hung so-called "Baby" or "Wee" motors. Although no part of the truck is closer to the ground than any part of the L. B.-type truck, the height of the center plate has been reduced about 6 in., making possible a very low step from the pavement to the floor of the entrance well. The compact arrangement of all the parts affords ample clearance between the top of the rails or pavement and the lowest part of the truck so that the car will not be stalled by obstructions in the street. This feature, of course, is important in operation in congested districts and especially during the snow season. Safety for high-speed service is obtained by the use of a twisted bottom bar which prevents any portion of the swing bale link or bolster from dropping in case of fracture.

The pedestal is of a new type to receive the same size journal spring over the journal box as that used on the L. B. truck. This spring is designed entirely to absorb the shock due to pounding on rail joints and special work, and thereby to eliminate the objections to the arch-bar type of truck which has only spiral springs for the riding of the car body. By the use of the Taylor continuous one-piece bale hanger the end surging or shucking motion of the truck, which is produced by the sudden stopping or starting of the car, is largely overcome. The bale hanger is supported on U-shaped



VIEW OF NEW REDUCED-HEIGHT TRUCK

hangers placed between the side bars of the main frame of the truck, and full elliptic springs used for the riding of the car produce the same riding qualities as the S. B. and L. B. types.

Special attention has been given to designing the brakes. The live and dead brake levers and brake hangers have ample clearances and are made without offsets to give a straight-line action and thus eliminate the twisting strains when the brakes are applied. The brake is released by adjustable flat brake release springs and the shoes are fitted to wear even with the periphery of the wheel.

This truck is equipped with a Taylor wrought steel bolster, self-lubricating center plates, adjustable side bearings and renewable wearing shims on the pedestals.

Recent Happenings in Great Britain

Scarcity of Materials and Labor Leads Board of Trade to Appoint a Committee to Deal With Shortages—Government Tramway Direction Likely

(From Our Regular Correspondent)

It is officially announced that, in view of the difficulty of meeting the demands for various materials and for labor required for the maintenance and renewal of the permanent way and rolling stock of the tramway undertakings in Great Britain, the Board of Trade is appointing a committee to consider the needs of these undertakings, so that the necessary steps may be taken to supply, as far as possible, such needs, even at some temporary sacrifice by less essential undertakings.

How Members Will Be Appointed.—The Municipal Tramways Association and the Tramways & Light Railways Association have been invited to nominate members of the committee, and the board has asked the London County Council to allow A. L. C. Fell, the manager of the Council tramways, to serve on it. This request has been granted. James Devonshire has been invited to be chairman of the committee. The London County Council, however, has announced its disapproval of that appointment. It considers the selection of an interested chairman to be unfortunate. It is also understood that J. B. Hamilton, general manager of the Leeds tramways, will serve on the committee. He will probably abandon the Admiralty work with which he has been connected for the last year or two. J. M. McElroy, general manager of the Manchester Tramways, will also serve on the board. He will probably have to abandon the other Government work in which he has been engaged for some time.

Severe Shortage of Material.—The principal difficulty in the way of the maintenance of efficient tramway facilities throughout the country is the lack of material for repairs and renewal. A general rearrangement and redistribution of rolling stock and other plant has become necessary in order to maintain adequate traveling facilities in areas and districts where large numbers of people are engaged on work of national importance in connection with the war.

Government Direction Likely.—The matter has been under the consideration of the Board of Trade and the Ministry of Munitions, and these Government departments have consulted representatives of the various tramway organizations. The result of the deliberations is understood to be that the Government proposes to assume direction of all the tramways, which will be run, as the railways are now run, principally in the national interest. The pooling of resources will permit special facilities to be provided in selected districts. The actual working of the systems will be left in the hands of the present officials, but the board will have the power to order curtail-

ment or rearrangement of services or redistribution of plant and appliances where required.

Cars and Materials to Be Concentrated.—It is understood that it will be the policy of the new board to concentrate available rolling stock and materials in the districts where the continuance of a frequent service of cars is essential. To do this it will probably be necessary to curtail the service on other routes to a considerable extent, even in districts where the volume of traffic at present may be both heavy and profitable. The expectation is that residential districts will suffer except in cases where they are served by the same cars that run to munition areas.

ADEQUATE POWER SUPPLY NEEDED

The Lord Provost of Glasgow and W. W. Lackie, the general manager and engineer of the Corporation Electricity Department, have given evidence in London before the committee on electric power supplies of the Board of Trade. That committee was appointed to consider what steps should be taken to ensure an adequate and economical supply of electrical power for all classes of consumers in the United Kingdom, particularly industries which depend on a cheap supply of power for their development. Recently the Town Council agreed to authorize the witnesses to state that if it was ultimately determined to divide the country into areas for the purpose of generating electricity, and an area was created for Glasgow and the Clyde and places adjacent, the Corporation was prepared to become the generating authority for such area, provided the terms and conditions upon which it was required to do so would not be detrimental to the city and its existing electrical undertaking.

ADDITIONAL WAR BONUS AWARDED

The committee on production has awarded an additional war bonus of 4s. a week, payable at the rate of 8d. a day, to the drivers and conductors, male and female, of the London & Provincial Union of Licensed Vehicle Workers. The committee has also granted an advance of 4s. a week in the wages of all drivers and conductors and the inside staffs of the Metropolitan Electric Tramways, Ltd., the South Metropolitan Electric Tramways & Lighting Company, Ltd., and the London United Tramways, Ltd.

CROYDON GOES BEHIND

The Croydon tramways and electricity undertakings, which in the past have relieved the rates considerably, show deficits of £1,633 and £1,690 respectively on last year's working. War allowances to tramway employees in the forces absorbed £5,824.

NEED FOR HIGHER FARES

The London United Tramways has intimated to the districts through which its lines pass that it is going to apply to Parliament for an Act asking to be relieved from the restrictions imposed on the company with regard to fares, so that it can raise them, and also for power to abandon some portions of its lines in Middlesex and Surrey.

TRANSFER CHANGES BENEFICIAL

The highways committee of the London County Council, reporting on fare changes and transfer facilities on the tramways, says that as a result of altered arrangements brought into operation early in October, facilities afforded to passengers in 1915 have been restored, but on a more extensive basis. The alteration has been effected with the primary object of recovering the necessary degree of control over the traffic. One important effect of the alteration has been a considerable reduction in the number of sections on the tickets. The committee adds that it is satisfactory to note that the alteration is having the effect of improving the carrying capacity of the tramways by acceleration of the service.

220 WOMEN DRIVERS IN GLASGOW

More than sixteen municipal tramway undertakings throughout the country employ women drivers. Glasgow has 220 of them. The highways committee of the London County Council, which has collected the facts, is shortly to consider a proposal to use women on the front platform. Women conductors have been employed for some time. The new Board of Trade committee has been asked to consider the feasibility of using the trams for carrying parcels, as in Bradford, and, to some extent, Leeds, the Potteries, and other places, and perhaps even for the carriage of mail bags.

ADVANCE ASKED IN NEWCASTLE

At a meeting of the tramway committee of the Newcastle Corporation a deputation of tramway workers, headed by the president of the Newcastle branch of the Tramway & Vehicle Workers' Union, waited on the committee in respect of an application for an advance of 5s. a week for motor-men and conductors; 2s. 6d. a week for women conductors and cleaners, and 2s. 6d. a week for lads of eighteen and under working as conductors. The application was referred to a sub-committee for consideration.

Many Other Pressing Problems.—The tramways committee is faced with many problems of importance at the present time. Pressure is continually being brought to bear upon the management for an increased service of cars for workmen, a great proportion of whom live far from their work. Another problem the management has to deal with is the difficulty of maintaining a regular service of cars in the winter time, when driving is always more difficult.

A. C. S.

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

Toledo Report Will Be Made to New Mayor

New Ordinance and Report in Type Awaiting Final Amendment and Signature of Mr. Doherty

The final report of the Street Railway Commission of Toledo, Ohio, will be made to Mayor Cornell Schreiber, successor of Charles M. Milroy. This was indicated by a note written to Mayor Milroy on Dec. 27, in which it was claimed that Henry L. Doherty had sought to reopen some of the features of the agreement which had been made between him and the commission. The note is as follows:

"The Toledo Street Railway Commission had hoped and expected to make a report to you, as Mayor, including an ordinance agreed upon by both parties after long negotiation with Henry L. Doherty.

"The agreement between Mr. Doherty and the commission was reached on Oct. 13, 1917, and the ordinance and a report addressed to you were ordered printed and were given to the printer at once.

"For weeks the ordinance and report have been in type awaiting Mr. Doherty's signature. Just recently Mr. Doherty has sought to reopen negotiations by objecting to some of the provisions to which he had already agreed.

"This has delayed our report and necessitates further postponement, and the making of a final report to your successor, who will have to deal with the street railway situation.

"The commission desires to thank you sincerely for your uniform courtesy and ready disposition to help in every way."

The members of the Toledo commission are: Johnson Thurston, president; E. P. Usher, Nat C. Wright and N. D. Cochran.

PERSONNEL OF ORIGINAL COMMISSION

Originally this commission, appointed soon after Mr. Milroy took his seat two years ago, was a committee, consisting of Carl Spitzer, James Thompson, Henry L. Doherty, Edward Usher, Johnson Thurston, N. D. Cochran, Nat C. Wright, R. C. Patterson and the Mayor himself. Mr. Cochran refused to sit with the committee as long as Mr. Doherty was a member, so Mr. Doherty withdrew. Then a sub-committee, consisting of Messrs. Cochran, Wright, Thurston and Usher, was named. When the sub-committee reported a community of interest plan, it was proposed that a street railway commission be established. Messrs. Spitzer, Thompson and Patterson thereupon resigned, leaving the sub-committee as the commission.

The Toledo *Times* contends that the members of the original committee and of the commission were named while Mayor Milroy was still a private citizen and that neither has a legal standing. If this is correct, it cannot bind the city to any action that may have been taken or may be taken in the future. This paper asks who is going to pay the expenses of the commission and what is proposed to be done about it.

MAYOR SCHREIBER WILL DECIDE

Since the whole matter now goes over to Cornell Schreiber, whose term began the first of the year, he will have the task of straightening out the muddle in which the street railway question and the community plan are involved. As city solicitor some years ago, Mr. Schreiber had considerable

experience in street railway matters. What his attitude toward the community plan may be is not known, but his friends assert that he will take a reasonable and proper course in his efforts to secure a settlement.

MR. DOHERTY SEEKS REVISION

At a conference recently it seems that Henry L. Doherty asked for a revision of some of the technical features of the condemnation clause in the proposed community plan, and that the request was refused. Johnson Thurston is said to be responsible for the course matters took, and Mr. Doherty declared that unless he changes his attitude and his tactics there is little hope of a peaceful settlement.

Mr. Doherty has asked for a conference with the entire commission, which now consists of the four men named and Mayor Milroy.

Recently the Toledo *Times* reprinted from the New York *Sun* the article on the community plan to which reference is made on page 56 in this issue.

Eighty-two Miles of Rapid Transit Lines

The Year 1917 Represented the Largest Single Increase in New Rapid Transit Facilities in New York Since 1904, When First Subway Was Opened

Many of the new rapid transit lines of the dual rapid transit system in New York not yet in service will be placed in operation during 1918. It is believed that unless undue delays occur in the delivery of materials, it will be possible to have upwards of 85 per cent of the total track mileage of the new lines of the system in operation by Dec. 31, 1918. Most of the remaining lines will probably be ready for service by mid-summer of 1919 or shortly after. This forecast is based on the theory that contractors will be able to obtain the requisite materials and labor to complete the work approximately within estimated periods.

Contracts already awarded for city-owned lines of the dual system, including those completed, now aggregate more than \$200,000,000, in addition to real estate purchases amounting to \$15,000,000. Exclusive of their own purchases of real estate, the two operating companies, the Interborough Rapid Transit Company and the New York Municipal Railway Corporation, have entered into contracts or agreements for construction of company-owned lines and for equipment on both city-owned and company-owned lines, involving a total of almost \$200,000,000 more.

The year 1916 represented the highest point in construction work under

dual system contracts, both the number of contractors and the working forces engaged during 1917 being substantially less than in previous years. Numbers will continue to decrease in the future. Only five general construction contracts remain to be let, out of the approximately ninety such contracts for new lines in the dual system. Practically all will be let during the next six or eight months, together with most of the remaining station finish, track installation and minor contracts.

The year 1917 represented the largest single increase in new rapid transit facilities provided for the traveling public of New York in any one twelve-month since the opening of the first subway in 1904. The lines or portions of lines placed in service in 1917 and to be placed in service early in 1918 aggregate approximately 82 track-miles, added to the track mileage of other new lines of the dual system previously placed in service, a total is had of 174 track-miles out of the grand total of 345 track-miles of new lines in the dual system. It is estimated that by the end of 1918 more than 300 track-miles will be in operation, leaving about 40 track-miles to be completed and placed in service in 1919 or thereafter.

It is expected that during 1918 both the Lexington and Seventh Avenue

lines will be in operation, including all of the Jerome Avenue branch and a part of the Pelham Bay Park branch of the Lexington Avenue line; that the Eastern Parkway line in Brooklyn and the Nostrand Avenue line in the same borough will also be in service, with the Webster Avenue Extension of the Third Avenue elevated railroad and the 162nd Street extension of the Ninth Avenue elevated line. All of the above lines are for operation by the Interborough Rapid Transit Company. Of the lines for operation by the Brooklyn

Rapid Transit subsidiary, the New York Consolidated Railroad, it is expected that the following will be placed in operation during 1918: The Broadway subway from Fourteenth Street to Forty-second Street for express service, and from Rector Street to Forty-second Street for local service, part of the Culver Rapid Transit Railroad, the remainder of the Jamaica Avenue line, the Montague Street Tunnel line, the Brighton Beach line connection, the East New York improvement and the Coney Island terminal.

operations on the foundation and track work, but Mr. Connette said that work was now progressing rapidly. He also pointed out that the company was working almost night and day trying to complete the North Elmwood Avenue double-track extension to the plants of the Curtiss Aeroplane Company, and other large war industries in this rapidly growing section. It is expected that this line will be completed and placed in operation within the next thirty days.

The Lafayette Square loop which the International Railway seeks to construct would probably halve the Washington Street congestion. The Broadway and probably the Sycamore Street lines, two of the heaviest patronized arteries to the east side, would make this loop and avoid the downtown congestion. The enlarged safety zone in Shelton Square would permit the loading of twice the present number of cars at one time at this point. The Niagara and the Grant Street lines make this loop their downtown terminus. It is also proposed to cut the long cross-town lines in two. The west side lines which continue out toward the east side city line pass through a congested section, and delays in this section caused the bunching of cars along the entire route. It is also proposed to reroute other lines so as to make quicker time between downtown outlying districts.

In replying to criticism of the company E. J. Dickson, vice-president, in a public statement placed full responsibility for delays and bunching of cars during the storm on Dec. 9 and 10 upon the track hog. Mr. Dickson said:

"During the storm thirty-two cars at one station were put out of commission by air pipes freezing. Because of the extraordinary exertion of the motors of the snow-fighting equipment these machines must have constant attention at the carhouses. A large proportion of the men at work in the shops and carhouses are diverted from passenger car maintenance to snow equipment maintenance. Also during the storm the mechanism of passenger cars develop defects which ordinarily would not occur. The operating mechanism of steps and doors is damaged, leads and contacts are broken and frequently air brakes are rendered inoperative because of the collection of snow and ice."

The statement also called attention to the fact that seventy-five men employed at one carhouse quit work when the storm started and that the company experienced the same shortage of help as other industries in western New York.

In replying to the criticism against lack of equipment, Mr. Dickson called attention to the fact that the company was unable to get delivery on 50 per cent of its new cars, orders for which were placed a year ago. The company has also placed orders for additional snow-fighting equipment which has not yet been received. Flat cars have been equipped with steel plows to aid in keeping the lines clear of snow.

City an Obstructionist

Dilatory Tactics of Buffalo City Council Prevent International Railway From Carrying Out Commission Recommendations

Unable to secure the co-operation of the municipal authorities, the International Railway, Buffalo, N. Y., has been prevented from making the improvements to its city lines which were recommended in the recent report of Charles R. Barnes, electric railway inspector for the Public Service Commission of the Second District. In consequence the daily newspapers have criticized the company's service severely, and the Buffalo Times has started an agitation for municipal ownership. Members of the City Council have pledged themselves to investigate the possibilities of taking over the railway properties within the city. The new Mayor was elected upon a platform of electric railway service reforms.

Aroused by the demands made by various commercial organizations which have allied themselves with the critics of the company, the Public Service Commission sent a communication to the City Council asking why action had not been taken on the requests of the railway for permission to lay additional tracks in the congested sections of the Main Street district. The company had previously filed applications with the City Council for permission to lay a single-track loop around the Soldiers' and Sailors' Monument in Lafayette Square so as to relieve the Washington Street congestion, and request was also made for permission to enlarge the safety zone in Shelton Square so as to allow three cars to be loaded at one time instead of two cars as under present conditions. The company also sought permission to construct a steel shelter house for the convenience of its passengers at Shelton Square. All of these applications have merely been "received and filed" by the municipal authorities.

In addition to hindering the company from making these necessary improvements to its service so as to facilitate the movement of traffic through congested centers, the municipal authorities did not co-operate with the company when it was making vigorous efforts to clear its tracks of snow after the severe snowstorm three weeks ago. This storm crippled the movement of cars on all lines, and when the city refused to aid the com-

pany in cleaning the streets, the company's tracks were blocked with vehicles which caused the bunching of cars.

When the Public Service Commission received the reply of the City Council regarding the delay in considering the requests of the railway, the commission announced a conference to be held in Buffalo between members of the City Council, officials of the International Railway and two members of the commission. On the day of the conference, none of the members of the City Council was present and the city was not represented. E. G. Connette, president of the railway, and Thomas Penney, vice-president and general counsel, attended and discussed the traffic problem with members of the commission.

SUPPLEMENTAL REPORT BY THE COMMISSION

Charles R. Barnes, inspector of the commission, was instructed to make an additional survey of traffic conditions, and this supplemental report will be made to the commission at Albany. After the conference with members of the Public Service Commission, President Connette made a statement to the newspapers in regard to the inability to maintain service on most of its lines during the week following the snowstorm. He said that the cars became crippled faster than the shops could repair them. Car door mechanism became disarranged in a large number of cars, air pipe lines froze and motors became crippled. He also placed a large part of the blame upon the "track hog," and he urged the police department to arrest all vehicle drivers who intentionally block the tracks.

SOME OF THE WORK UNDER WAY

Answering the criticism regarding the company's alleged inability to handle the employees of the large war plants in the Elmwood-Hertel section, President Connette called attention to the fact that the company had awarded contracts for the erection of a modern passenger loading terminal on property adjoining the plant of the Pierce-Arrow Motor Car Corporation in Elmwood Avenue. The blizzard and heavy fall of snow delayed building

Philadelphia Lease Measure Passed

Proposed Contract for Operation of New High-Speed Lines by the Philadelphia Rapid Transit Passed by One Branch of Councils

The Common Council of Philadelphia, Pa., on Dec. 31, by a vote of sixty-three to eight, passed the measure providing for the lease of the new high-speed rapid transit lines to the Philadelphia Rapid Transit Company, after it had been amended. The bill was to be acted upon on Jan. 3 by Select Council, and indications were that it would pass that body with little opposition.

The only opposition voiced in the Common Council came from Councilman Meckert of the Twenty-third Ward and Councilman Conn of the Eighth Ward. Mr. Meckert opposed the passage of the bill because of war conditions, and Mr. Conn moved that the entire matter be postponed until an opinion could be obtained from Mr. Connolly, the city solicitor.

Mr. Conn said that the people should have the expert opinion of the city solicitor, in addition to the "various verbal opinions of the special counsel who has been retained by the Mayor."

AMENDMENTS OFFERED

After Clerk Felton had read the first section of the bill Mr. Gaffney, chairman of the finance committee, offered amendments which made the supervising board a body of three instead of two members, but eliminated previous requirements that they all be engineers. Under the provisions of the lease the city's representative will be the director of city transit. His salary will be fixed by Councils. The company's representative will be appointed by the Philadelphia Rapid Transit Company and his salary will be fixed and paid by the company. The third member, who will serve as chairman, will be chosen by the Mayor and the president of the Philadelphia Rapid Transit Company. The amendments make the board a "supervising board" instead of a "super-vising board of engineers."

PASSAGE OF MEASURE URGED

In urging the passage of the measure Mr. Gaffney said:

"All the objections advanced by Mr. Conn and Mr. Meckert were threshed out thoroughly at the various committee meetings. The city solicitor has no objection to the passage of the lease. I see no reason why there should be any further delay. I think the lease should be approved right now. The question is not of abnormal or normal times. It is: Is this the best lease that can be obtained for the people? I tell you, with all the candor I possess, that you couldn't find better servants for the people than Doctor Lewis, adviser to the Mayor, and Director of City Transit Twining have been. If the matter is postponed the lease will simply be thrown back into the political field to be kicked about by both factions."

The chamber then voted down Mr. Conn's motion for postponement and the final vote was taken.

Mr. Lamberton, who had come to be regarded as the leader of the opposition, made a speech in favor of the arrangement.

St. Louis Sleeping

Writer Points Out Wherein City Has Failed to Make Most Out of Opportunities as an Interurban Center

An article by Hugh L. Wood on the front page of the *St. Louis Republic* for Dec. 29 calls attention to the need of St. Louis encouraging the building and extension of electric railway transportation from Illinois, Indiana, Kentucky, Ohio, and even Wisconsin and Michigan into that city. The article urges the building of an immense union passenger and freight station on Gratiot Street, between Twelfth and Fourteenth Streets. This property is now vacant, but Mr. Wood sees no obstacle to its purchase by the city and lease under favorable terms for a long tenure to the several interurban lines using the station. He said the Free Bridge should be opened to passenger, express and freight service.

THE LINKS THAT ARE NEEDED

Mr. Wood urged the connecting of St. Louis by electric railway with Terre Haute, Indianapolis, Fort Wayne, Louisville, Cincinnati, Dayton, Columbus, Cleveland, Toledo, Detroit and other cities and towns. Three links would have to be built, all of them comparatively short. They are: A link between the Illinois Traction System at Ridge Farm, Ill., and the Terre Haute, Indianapolis & Eastern Traction Company at Paris, Ill.; a connection between the Illinois Traction System at Danville, Ill., and the Fort Wayne & Northern Indiana Traction Company and the Terre Haute, Indianapolis & Eastern Traction Company at LaFayette, Ind., and a connection between the Illinois Traction System at Danville, Ill., and the Terre Haute, Indianapolis & Eastern Traction Company and the Indianapolis & Northwestern Traction Company at Crawfordsville, Ind.

Fuel Board Takes a Hand

Becomes a Player in the Detroit Railway Game and Has the Call With a Strong Hand

The Federal Fuel Administration has taken a hand in the electric railway situation in Detroit, Mich. As a result of an order issued by the Wayne County fuel administration the Detroit United Railway on Dec. 23 re-established skip-stop and rerouting operation, which the City Council had ordered discontinued two weeks before as a reprisal measure because of higher fares. The fuel board over-rode the Council even though that body had adopted a resolution warning the fuel board to "keep its hands off"

the car question. The fuel board declared that skip stops and rerouting were necessary to conserve coal. It was figured that by a return to their use from 50 to 75 tons a day would be saved.

Whereas formerly the Detroit United Railway had permission from the Council to operate skip stops on only eleven lines the fuel board order commands the company to extend this plan to every line in the city.

The action of the government is a move that the city hall politicians are unprepared to meet. The general public enthusiastically welcomed the return to skip stops and rerouting. Some of the Aldermen are considering further reprisals against the company. These may take the form of ordering the company to keep interurban, freight and construction cars off the city streets.

ILLUMINATION DECREASED

The order by the fuel board to the company also requested that artificial illumination of the cars be reduced 50 per cent. This has also been done.

Sir Albert Quoted

The *New York Times* for Jan. 4 contained a cable dispatch from London by its correspondent, Charles H. Grasty, who interviewed Sir Albert Stanley, president of the British Board of Trade. Sir Albert was quoted as saying that he regarded it as very desirable for the government to take the coal mines in with the railroads and co-ordinate and work them together. It was possible to save much mileage by bringing the source of production and the point of consumption as near together as possible. Both the railroads and the coal mines were under the Board of Trade in England and co-ordination was simple. The interview will prove of particular interest to Americans in view of Mr. Stanley's long association with electric railways in this country.

Preliminary Subway Survey

Cleveland Council Will Be Asked for an Appropriation of \$50,000

At a meeting of the Subway Commission of Cleveland, Ohio, on Dec. 28, it was decided to ask the Council for an appropriation of \$50,000 to cover preliminary engineering, legal and other expenses while an investigation is being made. A preliminary survey will be made. City Engineer Hoffman and Bridge Engineer Richards will act in an advisory capacity until a permanent engineer can be selected. Former Appellate Judge Walter D. Meals and former Municipal Judge Pierre White will be asked to act as special legal advisers under the supervision of City Law Director FitzGerald.

W. R. Hopkins, president of the Cleveland Rapid Transit Railway; O. P. Van Sweringen of the Cleveland & Youngstown Railway, and other men who have been connected with subway enterprises, will be called into consultation with the commission and joint meetings with the City Planning Com-

mission will be held in order to insure co-ordination between the two bodies.

Attorney William T. Redmond has been selected as secretary of the commission at a salary of \$3,000 a year.

U. S. Wants Men with Engineering Experience

The Army and Navy staff departments continue to demand men of engineering experience, especially in industrial lines. At present the outlook is that this demand will continue throughout the period of the war.

In calling attention to this, the United States Public Service Reserve, Washington, D. C., where records of men willing to serve when called will be kept on file, points out that a man of engineering experience has a rare combination of opportunities open to him which are not available to the average patriotic American, as follows:

1. To serve the country in his most effective capacity.
2. To keep in touch with his own profession, with the result that his patriotic service will not have caused him to become rusty by the time peace returns.
3. To become a commissioned officer and receive much better pay than the average man who has wholly subordinated personal interests and now works for the national good.
4. To perform his service usually without leaving the United States.

New City Officers' Plans

Mayor Hylan of New York and his incoming Board of Estimate have decided to ask the Legislature for sixteen specific laws, through which to fulfill the pre-election pledges made by the Democratic candidates. The program includes the following:

Legislation necessary to empower the city of New York to acquire and operate all public utilities.

The election of the Public Service Commission. The commission for the first district, which includes all of the greater city, to be composed of five commissioners, one chosen by the voters of each borough, thereby making that body responsive to the public.

Increase of the city's share of the new corporation franchise tax established by the Legislature in 1917 to 50 per cent instead of 25 per cent, as at present.

Bills to carry out these ideas probably will be introduced into the Legislature at once by Senators Robert F. Wagner and James A. Foley.

Subways for Tokio

Greater Tokio, according to the *Far Eastern Review*, Shanghai, will be surrounded with subway lines when the following plans are carried out: The Ikegami Electric Railway, capitalized at 400,000 yen, will connect Amori Station on the Railway Board Line to the Meguro terminus of the street car line,

covering 7 miles. The 5-mile line between Kameido and Matsuemura, starting from the Kinshibori terminus of the city train line, will be completed at the end of June. Other proposed lines are one along the River Edo, between Matsuemura and Shinkawaguchi; the extension of the Oji Electric Railway line from Otsuka to Shinjuku via Zoshigaya; and a line from Shinjuku to Horinouchi via Nakauo.

Bus Injunction Hearing Adjourned

Argument on the application of Henry H. Klein, a taxpayer, for an order restraining the Mayor and the Board of Estimate & Apportionment of New York from holding a hearing upon the application of the Fifth Avenue Coach Company for an omnibus franchise, was adjourned by Justice Platzek of the Supreme Court until Jan. 4. The adjournment was asked for by counsel representing all parties.

News Notes

Daily Paper Describes Toledo Settlement Plan.—The community plan of ownership for the settlement of the Toledo franchise deadlock was described in the magazine section of the New York *Sunday Sun* for Dec. 23. It was a very interesting account of the negotiations, heightened in its value by quotations direct from H. L. Doherty, chairman of the board of the Toledo Railways & Light Company. The article was signed by Harry Esty Dounce. It was accompanied by a portrait of Mr. Doherty.

Representative of the Department of Labor at Toledo.—In reply to the appeal of the motormen and conductors of the Toledo Railways & Light Company, Toledo, Ohio, the Federal Department of Labor has sent A. L. Faulkner, special agent, to Toledo to investigate the claims of the men that they are unable to live on the wages they are receiving. Some time ago they made a demand upon the company for an increase, although their present contract does not expire until April, 1919. Henry L. Doherty, in a conference with their representatives, declared that the wage scale could not be increased unless the rate of fare was increased at the same time.

Arbitration Award Made in Wilmington.—The committee of citizens of Wilmington, N. C., which was formed as a board of arbitration to act upon the complaints of the men and the Tidewater Power Company, operating the local electric railway in Wilmington, has filed its report, which allows an increase of 1 cent an hour to the

motormen and conductors. The men in Wilmington went on strike on July 4, 1916, and returned to work on July 12, that year, in accordance with the terms of an agreement reached through the efforts of a citizens' committee. Before returning to work, each man signed an agreement to abide by the conditions of the settlement. The strike was reviewed in the *ELECTRIC RAILWAY JOURNAL* for July 29, 1916, page 202.

Association Meeting Program

Northern White Cedar Association

The twenty-second annual meeting of the Northern White Cedar Association will be held at the Hotel Radisson, Minneapolis, Minn., on Jan. 22 and 23.

National Foreign Trade Council

James A. Farrell, chairman of the National Foreign Trade Council, has issued the formal call for the Fifth National Foreign Trade Convention to meet at the Gibson Hotel, Cincinnati, Ohio, on Feb. 7, 8 and 9, 1918. The theme of the convention will be "The Part of Foreign Trade in Winning the War."

Approximately one-half of the time of the convention will be given to the presentation of prepared papers and reports dealing with one or another of the numerous phases of this great convention theme. The remainder will be devoted to group sessions for the intensive discussion of single problems under the leadership of specially qualified experts.

CONSULS TO ATTEND

The Secretary of State will assign to the convention several Consuls General and Consuls from Europe, Latin America and the Far East, who are expected in the United States on leave at the time of the convention. These officials, several of whom have been in the consular service for many years, will be accessible to delegates for the purpose of personal conversation or for informal conference with groups of delegates.

In addition the Secretary of Commerce will assign to Cincinnati during the convention officials and experts of the Bureau of Foreign and Domestic Commerce, who will be available for individual consultation.

COLLECTION OF SAMPLES

Among the special features of the convention will be a large collection of samples assembled by the Bureau of Foreign and Domestic Commerce from all parts of the world, vividly showing the character of products marketed by other nations. The Pan-American Union will have representatives at the convention to supply information regarding the Pan-American friendship in commerce, and a number of gentlemen, long experienced in foreign trade, will be present to give particular advice to delegates on the details of foreign trade.

Financial and Corporate

Dallas Railway Reports

Balance of \$39,384 Shown for the First Month of Operation Under the New Service-at-Cost Franchise

The net earnings of the Dallas (Tex.) Railway, the electric railways consolidated under the Strickland-Hobson management, for October, 1917, the first month the lines were operated under the service-at-cost franchise, were \$66,191, according to the monthly report, filed with the Supervisor of Public Utilities by the company. Various deductions, aggregating \$26,807, are applied to the different reserve funds, leaving the company a balance of \$39,384 as a return upon the property value allowed by the franchise. This gives earnings of approximately 6 per cent on the agreed valuation. The franchise permits the company to show a return of 7 per cent before fares are automatically reduced.

REPORT SUMMARIZED

A summary of the report, prepared in the office of the Supervisor of Public Utilities, is as follows:

Gross Earnings—	October 1917	1916	Dec.
Railway	\$139,101	\$154,943	\$6,842
Interurban term.	9,952	8,930	*1,021
Total gross earnings	\$149,054	\$154,874	\$5,820
Operating Exp's—			
Railway	\$78,627	\$98,813	\$20,135
Interurban term.	4,235	4,454	218
Total operating expenses	\$82,863	\$103,267	\$20,403
Net earnings from operation ..	\$66,191	\$51,607	*\$14,583

*Increase.

These differences, it is said, are in large part due to the fact that under the method of accounting required by the franchise, an amount of \$12,260 for maintenance during October, 1917, has been charged to the "repair, maintenance and depreciation reserve" account, whereas the expenditures for this purpose in 1916 were charged to operating expenses.

Short Topeka Line Abandoned

State Commission Agrees to Discontinuance of 1½ Miles of Track

The Public Utilities Commission of Kansas has granted the Topeka Railway permission to remove the old track running southeast to old Vinewood Park. The line from California Avenue in Highland Park will be torn up and the rails will be used in other extensions the company may make in the future. In all about 1½ miles of track with side tracks at old Vinewood will be taken up.

Dan Patch Reorganization

If the Contemplated Plan of Reorganization Is Not Successful the Property Will Be Dismantled and Junked

With the purchase of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company's cut-off from Auto Junction to Luce Line Terminal by C. T. Jaffray and associates under foreclosure, noted in the ELECTRIC RAILWAY JOURNAL for Dec. 22, page 1136, plans were set in motion for reconstruction of the road from Minneapolis to Northfield and Faribault at a cost of \$750,000. Mr. Jaffray said:

"If our plans are met by investors, the road will be electrified for both freight and passenger traffic to Faribault. This would mean the bringing to Minneapolis of most of the business from the rich districts near Northfield, Faribault, Rochester and Mankato. Much of this trade now goes to St. Paul. C. T. Bratnober, receiver for the property during pendency of cases involving the status of the line, will have charge of the attempt to reorganize. If the plan for reorganization is not successful the property will be dismantled and sold for junk."

The sale of the cut-off was conducted by Howard S. Abbott, master in chancery. The only bid made was by the committee representing the holders of the collateral notes against the road. The purchasers under the court order have the right to scrap this 14 mile section, but operation has not yet been suspended.

Pittsburgh Interest Arranged

Philadelphia Company Arranges for the Payment of Interest on Bonds of Underlying Companies of Pittsburgh Railways

J. H. Reed, president of the Philadelphia Company, Pittsburgh, Pa., which controls the Pittsburgh Railways, has issued the following statement:

"The Philadelphia Company has, in the past, loaned large sums of money to the Pittsburgh Railways to enable it to continue its operations, and is now a creditor of the railway for a very large amount. The Philadelphia Company directors refuse to make any further loans to the railway, but in order to avoid hardship to security holders whose interest will come due on Jan. 1, 1918, the Philadelphia Company announces that, as the Pittsburgh Railways will not be able to pay the interest due on Jan. 1, 1918, upon bonds of the underlying companies in the Pittsburgh Railways system it has arranged with

the Farmers Deposit Company, Pittsburgh, to purchase the coupons representing the said interest, when properly presented to it by the holders, with the certificates of ownership attached which are required by the Federal income tax law."

The companies named were as follows: Central Traction Company, Duquesne Traction Company, Federal Street & Pleasant Valley Passenger Railway (general mortgage), Federal Street & Pleasant Valley Passenger Railway (consolidated mortgage), Pitcairn & Wilmerding Street Railway, Pittsburgh, Canonsburg & Washington Railway, Pittsburgh, Crafton & Mansfield Street Railway, Pittsburgh Incline Plane Company, Pittsburgh & West End Passenger Railway, Second Avenue Traction Company, United Traction Company, Washington & Canonsburg Railway, West End Traction Company, West Liberty Street Railway, West Liberty & Suburban Street Railway.

Canadian Issues Under Regulation

New Financial Offerings Must Have Certificate of Approval from Finance Minister

Under the authority of the war measures act the Union government has passed an order-in-council by which new issues of bonds in Canada, whether by any provincial, colonial or foreign government, municipality, commission, local government, institution, corporation or incorporated company, can only be made or sold with the approval of the Minister of Finance by his certificate in writing.

The order equally applies to any offering of shares, whether preferred or common, of any incorporated company, from this time onward. Provision is made whereby any issue or sale in contravention of the prohibition may be restrained. Heavy penalties are provided for violation of the regulation.

The regulation is similar to that which has been in force in Great Britain and has the same object of conserving the financial resources of the country for war purposes.

Public Represented on Board

Alfred M. Lyon, Newtonville, Mass., has been selected by a committee representing the Newton Board of Trade and all the village improvement societies in the city as their representative on the board of directors of the Middlesex & Boston Street Railway, Newtonville, Mass. This action is on the suggestion of James L. Richards, president of the railway. The appointment of a representative of the people to the board is in connection with the concerted protest of the public against a further increase of fares. Mr. Richards told the committee that in placing a representative in the councils of the road intimate knowledge of its workings and needs could be gained. Mr. Lyon is a lawyer and school board member.

Financial News Notes

Lancaster Company Increases Its Stock.—The Lancaster County Railway & Light Company, Lancaster, Pa., has increased its authorized capital stock from \$2,500,000, of which \$1,000,000 is 5 per cent cumulative preferred, to \$3,750,000.

Lorain Bonds to Be Extended.—The Ohio Public Utilities Commission has authorized the Lorain Street Railroad, controlled by the Lake Shore Electric Railway, to extend for two years the \$200,000 of 6 per cent notes maturing this month.

Common Stock Dividend Reduced.—The directors of the Philadelphia Company on Dec. 17 declared a quarterly dividend of 1½ per cent on the common stock. This is one-fourth of 1 per cent less than the company has paid for a number of years.

Charlottesville Preferred and Common Dividends.—The Charlottesville & Albemarle Railway, Charlottesville, Va., has declared a semi-annual dividend of 3½ per cent on its preferred stock, making 7 per cent for the year, and 2 per cent on its common stock, making 4½ per cent for the year.

New Stock for Public Service Railway.—A decision has been rendered by the State Board of Public Utility Commissioners of New Jersey approving the application of the Public Service Railway, Newark, N. J., for authority to issue \$1,250,000 of its capital stock. The company is controlled by the Public Service Corporation of New Jersey.

Successor to Snake Line Seeks to Issue Stock.—Officials of the Swansea

& Seekonk Street Railway, Swansea Centre, Mass., the successor to the Providence & Fall River Street Railway after the property of the latter had been sold for junk, appeared before the Massachusetts Public Service Commission recently and petitioned for approval of an issue of \$100,000 in stock.

May Prove His Claim.—The Supreme Court of Illinois has denied a petition for a rehearing prayed by the Woodstock & Sycamore Traction Company, Genoa, Ill., in its defense against John Seymour, one of the original organizers of the road. Mr. Seymour now has the opportunity to prove his claim of \$40,000 against the company.

Action on Boston Suburban Dividend Deferred.—The trustees of the Boston (Mass.) Suburban Electric Companies took no action on Dec. 28 on the preferred stock dividend, due this month. Two payments of 50 cents each were made in January and April, 1917. In 1916 and 1915 \$3 was paid. The preferred stock is entitled to 4 per cent per annum, which is cumulative.

Make Your Claim.—J. Moss Ives, receiver for the Danbury & Bethel Street Railway, Danbury, Conn., is giving notice to the creditors of the company that the Superior Court in and for the county of Fairfield has ordered and adjudged that four months from Dec. 14, 1917, be limited for the presentation of claims against the railway and that all claims not presented within the time limit will be thereafter barred.

Dunkirk Railway Seeks Service Reduction and Higher Fares.—Efforts are being made by the receiver for the Dunkirk (N. Y.) Street Railway to sell the property. The company has an application pending before the Public Service Commission of the Second District of New York for permission to abandon part of its line. An application has also been made for permission to increase the rate of fare within the city from 5 cents to 6 cents.

Another Road in Danger of Being Scrapped.—Gustave Benjamin, Buffalo, N. Y., has bought the property of the New York & Pennsylvania Railroad, operating between Canisteo, N. Y., and Shinglehouse, Pa. The amount involved was approximately \$350,000. Unless sufficient funds can be raised along the line to keep the property in operation, Mr. Benjamin will junk the road. Commercial organizations in the towns along the railroad are reported to be considering the organization of a company to electrify the line.

Mortgage for \$5,000,000 Recorded.—The Springfield Street Railway has filed in the registry of deeds at Springfield, Mass., a mortgage for \$5,000,000 in favor of the Old Colony Trust Company, Boston, Mass., for refunding purposes. In November, 1917, the company was authorized to issue at this time not to exceed \$3,275,000 of mortgage bonds, payable twenty years from date and bearing interest at 6 per cent. The proceeds of bonds amounting to \$2,305,000 will be applied exclusively to the payment, refunding or retiring of bonds issued by that company by reason of its purchase of other railway properties.

Abandonment of the Cincinnati-Bethel Line Proposed.—C. M. Leslie and Charles Thrasher, receivers of the Interurban Railway & Terminal Company, Cincinnati, Ohio, plan to apply to the Ohio Public Utilities Commission for authority to abandon the branch between Cincinnati and Bethel. At the same time application for permission to increase the rates of fare on the Rapid and Eastern divisions will be made. Some time ago Judge Cushing of the Common Pleas Court authorized the receivers to abandon the Bethel branch, but the Appellate Court decided that they had no authority to take this step. Since that time a new law has gone into effect on this point, and, with the authority of Judge Cushing, they will take the matter to the Public Utilities Commission.

Electric Railway Monthly Earnings

CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Oct., '17	\$43,397	\$28,169	\$15,228	\$6,551	\$8,677
1 " " '16	56,466	18,205	18,261	6,568	11,693
12 " " '17	450,537	234,065	166,472	78,684	87,788
12 " " '16	387,757	227,251	160,506	78,470	82,036

CITIES SERVICE COMPANY, NEW YORK, N. Y.

1m., Nov., '17	\$1,732,412	\$30,050	\$1,702,362	\$209	\$1,702,153
1 " " '16	1,328,388	20,021	1,308,367	244	1,308,123
12 " " '17	19,110,628	347,281	18,763,347	2,948	18,760,399
12 " " '16	9,071,718	236,868	8,834,850	299,480	8,535,370

COLUMBUS (GA.) ELECTRIC COMPANY

1m., Oct., '17	\$104,130	\$36,447	\$67,683	\$31,593	\$36,090
1 " " '16	84,786	30,405	54,381	28,572	25,809
12 " " '17	1,057,281	402,868	654,413	352,640	301,773
12 " " '16	847,466	343,413	504,054	343,884	160,170

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

1m., Nov., '17	\$538,572	\$270,131	\$268,441	\$217,983	\$50,458
1 " " '16	512,904	\$224,107	288,797	215,702	73,095
5 " " '17	2,572,504	1,260,851	1,311,653	1,088,924	222,729
5 " " '16	2,397,008	1,084,185	1,312,823	1,075,132	237,691

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

1m., Nov., '17	\$3,454,687	\$1,900,069	\$1,554,618	\$1,097,265	\$457,353
1 " " '16	3,451,756	1,575,179	1,876,577	1,005,553	\$871,024
5 " " '17	15,928,087	9,013,680	6,909,407	5,380,053	\$1,529,354
5 " " '16	15,388,778	7,437,878	7,950,900	4,974,641	\$2,976,259

JACKSONVILLE (FLA.) TRACTION COMPANY

1m., Oct., '17	\$59,743	\$42,606	\$17,137	\$15,819	\$1,318
1 " " '16	49,646	34,930	14,716	15,437	\$721
12 " " '17	678,268	455,967	222,301	188,242	\$34,059
12 " " '16	619,387	422,793	196,594	182,308	\$14,286

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

1m., Nov., '17	\$533,250	\$375,467	\$157,783	\$80,318	\$77,464
1 " " '16	458,668	238,697	219,971	106,149	113,822
11 " " '17	5,814,817	3,648,752	2,166,065	859,140	1,306,925
11 " " '16	4,689,676	2,389,776	2,299,900	1,038,490	1,261,410

PENSACOLA (FLA.) ELECTRIC COMPANY

1m., Oct., '17	\$25,807	\$15,592	\$10,215	\$7,808	\$2,407
1 " " '16	21,439	12,319	9,120	7,714	1,406
12 " " '17	331,242	193,106	138,136	93,405	44,731
12 " " '16	279,557	154,398	125,159	91,217	\$33,942

REPUBLIC RAILWAY & LIGHT COMPANY, YOUNGSTOWN, OHIO

1m., Nov., '17	\$464,296	\$327,584	\$136,712	\$90,184	\$46,528
1 " " '16	344,942	196,083	148,859	70,848	\$78,014
12 " " '17	4,770,074	3,203,779	1,566,295	995,388	\$569,906
12 " " '16	3,935,073	2,271,569	1,663,504	816,605	\$848,898

TWIN CITY RAPID TRANSIT COMPANY, MINNEAPOLIS, MINN.

1m., Nov., '17	\$807,839	\$553,543	\$254,296	\$164,511	\$89,785
1 " " '16	848,497	521,767	326,730	137,676	\$189,054
11 " " '17	9,345,633	6,250,474	3,095,159	1,691,344	\$1,403,815
11 " " '16	9,290,401	5,727,440	3,562,961	1,572,554	\$1,990,407

*Includes taxes. †Includes non-operating income.
*Includes accruals, under rapid transit contracts with city, payable from future earnings.

Traffic and Transportation

Commission Upheld in Indianapolis Fare Case

Circuit Court Decides Against Indianapolis Traction & Terminal Company in Its Effort to Compel Public Service Commission to Assume Jurisdiction in Rate Case

Judge Lewis B. Ewbank in the Circuit Court, Marion County, on Jan. 2 handed down a decision finding that the Public Service Commission ruled correctly in declining to accept jurisdiction in the case of the petition of Indianapolis Traction & Terminal Company for a 5-cent fare. The decision of court is summed up as follows:

DECISION SUMMED UP

The city franchise of the Indianapolis Traction & Terminal Company—"relator"—fixing the rates of fares on street cars in the city of Indianapolis is a binding contract which excludes all jurisdiction of the Public Service Commission to increase or otherwise modify or change such rates while that contract remains in force. The only consent which the state has given or undertaken to give for any release or modification of any of the terms of that franchise contract was by the voluntary surrender of the franchise "prior to July 1, 1917." It was not so surrendered. Whether its surrender would have released the relator from its obligation to the city and its inhabitants to maintain the franchise rates of fares is not before the court and is not decided. The state legislature has no constitutional power to authorize the Public Service Commission to relieve the traction company "relator" of any part of the obligations of the franchise contract or otherwise to modify that contract so long as the contract has not been surrendered, forfeited, or otherwise terminated. A mandamus will not issue to require the Public Service Commission to entertain in a petition for an increase of passenger fares on an electric railway where it affirmatively appears that, because of a binding franchise contract fixing the rates of fares for the remaining fifteen years of a term for which the contract was entered into by express legislative authority, the commission has not power to grant any relief.

TRIAL OF THE CASE

Arguments were heard before Judge Lewis B. Ewbank on Dec. 26, 27 and 28 in behalf of the petition of the company, to compel the commission to take jurisdiction and investigate the company's request for an increase in rates of fare to straight 5 cents. The commission had ruled several days previously that it was without jurisdiction because the Indianapolis franchise was granted under specific delegated authority by the Legislative act of 1899 and because the

company did not surrender its franchise before July 1 of this year and accept an indeterminate permit.

The company was represented by Ferdinand Winter and W. H. Latta. The attorneys who appeared against the petition were W. Masson, M. H. Miller and Assistant Attorney-General Lesh.

THE COMPANY PRESENTS ITS SIDE

Mr. Winter's theory of the case was that the State had full power over franchises, that a city was merely the agent of the State, and that whenever the State, the principal, decided to modify a contract it could do so provided the other party, the public utility corporation, consented. He submitted that there were only two parties to a utility franchise contract, the utility corporation and the State, so that if the two parties to the contract agreed there was no objection in law and there was no impairment of the obligations of a contract, which the attorneys for the Public Service Commission had emphasized in their arguments. Mr. Winter further submitted that the Legislature had conferred full rate-making power on the Public Service Commission, and that if the commission chose to do so it could change any utility franchise rate, with the consent of the public utility corporation, because the commission would be exercising the State power over franchises, which Mr. Winter repeatedly asserted was complete.

In referring to arguments of attorneys for the other side and commenting on the court decisions, they had cited in support of the proposition that a State might delegate express authority under which a contract could be made, which the State itself could not modify, Mr. Winter submitted that all such decisions arose out of a state of facts in which the public utility corporation itself was contending that subsequent action by the Legislature would impair the obligations of its contracts. He said: "Every case on which they rely for authority is where the controversy arose between the State or city on the one side, and the public utility corporation on the other."

Will H. Latta, for the company, said the intention of the State in the act of 1913, creating the Public Service Commission, was to exert all the power it has. He said he went a little beyond Mr. Winter in the belief that in the 1913 law the Legislature gave to every public service corporation just, reasonable and sufficient rates. The law added burdens to such corporations, and at

the same time it provided that compensation should be adequate for the increased burdens. He believed that the commission could put any burdens on a public utility corporation it saw fit, but the rates had to be sufficient to carry those burdens. The law of 1913, he argued, was a guarantee of adequate rates.

Mark Miller made the first of the closing arguments. He thought it was not reasonable to assume that the Legislature had created a commission with power to change a contract only adversely to the city.

Chicago Elevated Fare Announcement

President Budd Intimates Chicago Elevated Railroads Favor Zone System for Future Use

Britton I. Budd, president of the Chicago (Ill.) Elevated Railroads, announced on Dec. 30 that the application of the company to the Public Utilities Commission of Illinois for permission to charge a higher rate of fare and probably the right to carry package freight would be filed early in January. Higher operating costs is the reason given. It is likely that the zone district will be the basis for the proposed increased rate.

EXPENSES UP

The *Elevated News*, issued monthly by the railway, outlines the roads' position in the December issue as follows:

"The roads want their patrons to know the facts. Every economy possible is being practised, but the revenue is insufficient. Everything which the road has to buy has gone up in price. The increase in wages alone in the last three years amounts to more than \$1,000,000 a year. The pay roll for October last shows an increase of \$87,101 over the pay roll for October, 1914. That is at the rate of \$1,045,220 a year.

"Through routing and free transfer privileges have increased the length of the haul on the elevated roads until it is now 6½ miles, twice what it was five years ago. The people want to get out of the congested districts. Each year they move farther out, but they still continue to pay the same little old nickel which did service in the horse-car days.

NICKEL HAS SHRUNK

"That nickel isn't nearly as big in purchasing power as it was in the horse-car days, either. If you think it is, try it on the baker for a loaf of bread, or on the milk man for a quart of milk, or on the grocer for a pound of sugar. They won't take it. But the elevated roads have to take it. Don't you think that is just a little unreasonable?"

On the proposed freight privilege is this sentence:

"Hundreds of commodities now shipped as package freight over the steam roads, congesting terminals and utilizing equipment, can be handled by electric lines, can be handled at hours when their equipment is otherwise idle."

Wages Dependent on Fares

Pittsburgh Railways Announces That Increase is Dependent on the Company Securing Six-Cent Fare

The Pittsburgh (Pa.) Railways, as noted briefly in the *ELECTRIC RAILWAY JOURNAL* of Dec. 29, page 1175, announced on Dec. 21 an immediate increase of 2½ cents an hour in the wages of its trainmen. At the same time the company said that a further advance of 2½ cents an hour would be made if the request of the company to the Public Service Commission for an advance in fares was allowed. A statement which was issued by the company follows:

COMPANY STATEMENT

"As a result of numerous conferences between representatives of the city of Pittsburgh and representatives of motormen and conductors and officials of the Pittsburgh Railways, a tentative arrangement for the temporary restoration of rush-hour tripper and trailer service has been made, effective tomorrow morning.

"In order to accomplish this without further delay, the Pittsburgh Railways agreed temporarily to advance the wages of the motormen and conductors 2½ cents an hour to facilitate the improvement of the rush-hour service pending the filing with the Public Service Commission of a new schedule advancing the present rate of fare to 5½ cents when tickets are used, and to 6 cents when cash fare is paid. As soon as this increased fare goes into effect the advance in wages of the motormen and conductors will be made 5 cents an hour. This will amount to several hundred thousand dollars a year. As a result of this increase the motormen and conductors agreed to operate the rush-hour trippers and trailers, which they have refused to operate for the past nine weeks.

"The advance in wages is given despite the fact that the wage agreement with the motormen and conductors, made in May, 1916, for the existing wages, does not expire until April 30, 1918."

THE NEW WAGE SCALE

The 2½-cent increase is operative until Feb. 1, when, if the increased fare the company asks is allowed by the Public Service Commission, the increase in wages will become 5 cents an hour for every man, or a minimum of 32 and a maximum of 40 cents an hour. On a nine-hour day, which is the average day, the motormen and conductors would, after Feb. 1, receive from a minimum of \$2.86 to \$3.60 a day. With the increase which has just been granted in effect the wage scale is as follows: First six months' service, 29½ cents an hour, instead of 27 cents, the present minimum; second six months, 31½ instead of 29 cents; second year, 33½ instead of 31 cents; third year, 35½ instead of 33 cents; fourth year, 36½ instead of 34 cents; fifth year of service and thereafter, 37½ instead of 35 cents.

The City Council by unanimous vote has directed C. K. Robinson, assistant city solicitor, to oppose the proposed new tariff before the Public Service Commission. Under the Pennsylvania public service corporations law public notice of a change in tariffs by a public utility corporation must be made thirty days in advance of the new tariff taking effect.

Asked for Bread and Got a Stone

The railway manager who asks his patrons for advice is indeed a brave man. But temerity among managers is not dead, although there has been more than enough in recent years to kill it. One brave manager who recently threw discretion to the winds and asked for advice received this caustic reply:

"The notices you have pasted in the cars asking the help and criticism of the public might be passed as a joke or 'bull' if they were not in fact an insult on injury.

"When you have done 50 per cent of what you or your office boy knows should be done, the efficiency of the service will be materially increased and suggestions from patrons might then be appropriate.

"Possibly you want the patrons to run the business while you devote your time to increasing fares and reducing taxes.

"It is difficult to imagine what more the patrons can do, unless we ride the roof or brake beams and send our money by mail. We wait and wait for cars (?).

"Sometimes one comes along and we crowd in till it is difficult to breathe. As a rule there would not be half straps enough to hang on if all straps were there, but many are absent and others broken."

I. U. T. Fare Increase Allowed

Indiana Commission Grants Main Requests of Indiana Union Traction Company for Fare Increases

The Public Service Commission of Indiana on Dec. 28 handed down its decision on the petition of the Union Traction Company for increased rates of fare.

THE NEW RATES

The commission permitted the company to increase its rate for mileage books on its lines to 2 cents a mile; to increase its rates for commutation tickets to 1½ cents a mile from 1¼ cents, the former mark, and to increase the rate for school passengers on its lines to 1 1/5 cents a mile.

The round-trip fare between Indianapolis and Fort Benjamin Harrison will be increased to 35 cents, and the single fare between the military reservation and the city will be 25 cents. The fare between Indianapolis and Lawrence, under the new order, will be 35 cents for the round trip daily and 25 cents for the single fare between those points.

NEW RATES FROM JAN. 1

Abolishment of the sale of six tickets for a quarter was authorized on the urban lines of the company in Anderson, Marion, Muncie and Elwood, where hereafter a straight 5-cent fare will be in effect. The new rates were to become effective Jan. 1, 1918, provided the company filed new tariffs, covering such advances, by that date.

PART OF DECISION HELD UP

The commission held up its decision in the part of the petition that asked authority to increase the minimum interurban fare of the company from 5 cents to 10 cents, after the members tentatively had agreed that the body would deny the right to increase the minimum under existing statute prohibitions, although at least some mem-

bers believed that the minimum should be increased. This matter, the underlying legal theory of which will figure also in rate increase petitions from other interurban systems, to be heard by the commission early in January, probably will be decided later.

OPINION BY COMMISSIONER CORR

After a legal discussion regarding the commission's powers in the deciding of the part of the petition referring to the Broad Ripple increase, the opinion, which was written by Edwin Corr, of the commission, says:

"Applying to this statute the well-established rule of interpretation, that the mention of one thing is the exclusion of the others, this commission is forced to the conclusion that the provisions of this franchise contract are void which undertake to fix rates for service outside the town of Broad Ripple. The town of Broad Ripple had authority to regulate and fix rates within said town, but it had not power to fix rates between Broad Ripple and Indianapolis."

The commission further stated that a 5-cent fare between Broad Ripple and Indianapolis was a very low one and that the commission had been disposed to increase this fare were it not convinced from evidence introduced that the company at this time was not providing adequate service between Indianapolis and Broad Ripple. The commission intimated, however, that if the company will improve its service it will entertain an application for an increase of the fare on the Broad Ripple line.

In discussing the increased revenue to the company from the fare increases granted the commission's order said:

"The increase in fares and charges which this commission will allow, as indicated above, based upon receipts

for the first ten months of 1917, and an estimate for the last two months of that year, it is estimated, will produce an increased revenue of approximately \$101,833."

The hearings before the commission in this case were reviewed in the *ELECTRIC RAILWAY JOURNAL* of Dec. 22 and 29.

Inquiry into Kansas City Service

The Public Service Commission of Missouri has announced that it will conduct an investigation into the service of the Kansas City Railways. The hearings are to begin on Jan. 9. The service engineers of the commission are in Kansas City conducting preliminary investigations before the hearings proper are begun. In making this announcement the commission said:

"The commission will proceed on its own motion to investigate fully the service rendered. Notice is hereby given that a proceeding of inquiry and investigation be and is hereby instituted by the commission on its own motion to determine the character of the service rendered by the Kansas City Railways."

ACTING PRESIDENT READY AND WILLING

Clyde Taylor, acting president of the company, says:

"The Kansas City Railways will welcome an investigation by the commission and will co-operate with that body and furnish it the fullest information upon any subject. Coal, labor shortage, limitation of power due to long delays in deliveries of electrical machinery, tremendous increased cost of operation, and other factors, and the relation of these to service can be investigated by the commission which is fully equipped for such work. It is the desire of the officials of the company to render the best possible service in these abnormal times and if the commission can find ways in which that can be done it will be rendering a necessary service."

Curtailed Service Protested

Representative of City of Seattle Suggests Use of Women on Cars as One Way Out

In registering a complaint against curtailed service on the railway lines of the Puget Sound Traction, Light & Power Company in Seattle, Wash., A. L. Valentine, Superintendent of Public Utilities, recommended to that company that women be used as conductors. Mr. Valentine said:

"While I appreciate the fact that you are having trouble in obtaining operators for your cars, the transportation situation is so acute that I am going to suggest that you endeavor to obtain women conductors in an effort to relieve conditions which are rapidly growing worse."

According to Mr. Valentine, the company is called upon to transport more passengers each day than ever before, and to aggravate this condition there is a shortage of from one to eight crews

on every line almost every day. In registering his complaint Mr. Valentine accompanied his letter with records of car checks made by inspectors of his department on Dec. 19.

A. W. Leonard, president of the company, said:

"We are making every effort to obtain sufficient men to maintain adequate service on all our lines, and while we are adding men daily, many of the lines are being operated frequently on curtailed schedules, because of a lack of operators. It may be necessary as a war measure to employ women as conductors, in order to release men for other work. No steps to that end have yet been taken."

Forum and His Little Brother

The United Railways & Electric Company, Baltimore, Md., through *Forum* and his little brother, *Trolley News*, the first published by the com-

pany carry the workmen to and from work. He said:

"It is almost impossible to keep men when they have to hang on a street car for an hour or two in order to get to work and then to get home in the evening."

He said that by commandeering transportation facilities of this kind the force of workmen could be increased by providing a greater living area. Two cases, which Admiral Bowles said were typical, were cited by him.

Appeal to Shop Early

By Josh Wink in "The American"

Shop early and often,

If so you incline,

O pitying women,

But please draw the line

At riding in hours

When workers must rush,

And so keep the traffic

From being a crush.



HOLIDAY GREETING OF THE COMPANY AT BALTIMORE

pany in the interest of the employees and the second in the interest of the public, is extending holiday greetings to patrons and friends in the form of a card 6 in. wide by 3½ in. high done in colors. The card, about two-thirds the original size, is shown in the accompanying engraving.

Transit Facilities Poor

Admiral Bowles Complains About Lack of Accommodation for Shipyard Employees

Admiral Bowles, head of the construction department of the Emergency Fleet Corporation, before the Senate committee conducting the shipping inquiry, asked on Dec. 28 for authority to commandeer houses, street cars and ferry boats, and to declare war zones about certain shipyards in order to clean them up and make them habitable for shipyard employees. He explained that his program contemplated requiring electric railways to operate special cars to

So you'll conserve fuel,

And you'll conserve space,

You'll, too, conserve labor,

And if by your grace

These do double duty

Thus economized,

You're doing a service

To be highly prized.

So, ladies, shop early,

For leisure is yours,

The hours restricted

To others restores

Your consideration;

Then go home and knit

Content with your conscience

For doing your bit.

According to J. F. Strickland, president of the Texas Electric Railway, Dallas, Tex., it appears most likely in the present government emergency that the transportation of freight will be centered in the steam lines and that the interurban electric lines will be designed as passenger carriers where steam and electrics serve the same territory.

Another Pennsylvania Fare Increase.—The Shamokin & Mount Carmel Transit Company, Mount Carmel, Pa., operating between Shamokin and Ashland, will increase its rates from 5 to 6 cents per zone on Jan. 15, and will withdraw from sale the three-for-a-quarter tickets which have been in use between Ashland and Centralia.

No Expert for St. Louis.—The ordinance providing for an appropriation of \$5,000 for hiring an expert to advise the public utilities committee of the Board of Aldermen of St. Louis, Mo., in connection with the preparation of a new franchise ordinance for the United Railways Company was killed in the Board of Estimate and Apportionment.

Legislators Will Not Be Favored.—The Kentucky Traction & Terminal Company, Lexington, Ky., has declined to quote reduced rates between Frankfort and Lexington to persons who, during the session of the coming Legislature at Frankfort, wish to make their headquarters at Lexington. The Louisville & Nashville Railroad and Chesapeake & Ohio Railroad will issue commutation tickets.

Paper for San Diego Railway Patrons.—The San Diego (Cal.) Electric Railway, beginning Jan. 1, 1918, will issue a monthly pamphlet for the purpose of acquainting the public with the aims of the company regarding service, improvements, changes and happenings affecting electric railway operation in San Diego. The pamphlet will be placed in boxes in the cars and will be mailed to persons desiring it. Ernest L. Phillips is advertising manager of the company.

I. T. S. Christmas Greeting.—What should serve as a worth-while reminder of the satisfactory service and amiable relations which have existed during the year is contained in the Christmas greeting sent out by the Illinois Traction System, which was engraved on an attractive card and read as follows: "We feel that the year 1917 should not pass without some expression of gratification over the cordial relations existing between us, and we desire to convey the season's best wishes for a Merry Christmas and a Prosperous New Year. Signed, ILLINOIS TRACTION SYSTEM (McKINLEY LINES)."

Jitney Bonding Company Quits.—The Golden State Indemnity Company of California is retiring from the field. The company was headed by Andrew J. Gallagher, one of the supervisors of San Francisco and enjoyed virtually a monopoly of the jitney bus insurance business. The reason announced for the retirement is the inability to raise \$75,000 additional capital by Jan. 10 which the company would require if it were to continue in business under recently enacted laws. It is announced that the Western Indemnity Company will take over the unexpired policies of the retiring company, but that hereafter the insurance rate will be \$12.50 per month instead of the \$8 previously in effect.

Personal Mention

C. G. Ballentyne has resigned as general manager, purchasing agent and claim agent of the Honolulu Rapid Transit & Land Company, Honolulu, Hawaii.

Howard E. Jaeger has recently been advanced to the position of purchasing agent for the Oakland, Antioch & Eastern Railway at Oakland, Cal., succeeding Ernest E. Haquette, resigned.

W. M. Bird, formerly assistant superintendent of transportation of the Tampa (Fla.) Electric Company, has been appointed superintendent of transportation to succeed G. A. Webb.

B. H. Meyer, appointed to the Interstate Commerce Commission from Wisconsin, has been nominated by President Wilson for reappointment for the seven-year term expiring on Dec. 31, 1924.

G. A. Webb, formerly superintendent of transportation of the Tampa (Fla.) Electric Company, has been appointed traffic manager of the company. Mr. Webb has been with the company for about twenty-five years in various capacities.

E. A. Merrill has been appointed chief engineer of the power station of the Galesburg Railway, Lighting & Power Company, Galesburg, Ill., controlled by the Illinois Traction Company, to succeed L. N. Jenkins, resigned. Mr. Merrill was formerly connected with the Underfeed Stoker Company, Chicago, Ill.

R. E. Kelly has been made general agent of the Pacific Electric Railway, Los Angeles, Cal. Mr. Kelly began service with the Pacific Electric Railway in 1901 as a conductor. At the time of his appointment as general agent he was general agent of the eastern division with headquarters at San Bernardino.

Foster Hannaford, for two years superintendent of the St. Paul lines of the Twin City Rapid Transit Company, has been appointed general manager of the company, the duties of which office have been carried on for six years by President Horace Lowry. Mr. Hannaford was born in St. Paul. He is a son of J. M. Hannaford, president of the Northern Pacific Railway.

William Siebert, superintendent of surface railroad transportation of the Brooklyn (N. Y.) Rapid Transit Company, has been elected a director of the Nassau Electric Railroad; Brooklyn, Queens County & Suburban Railway, and the DeKalb Avenue & North Beach Railroad Company, all subsidiaries of the Brooklyn Rapid Transit Company, to succeed Slaughter W. Huff, now president of the Third Avenue Railroad, New York.

Van Dusen Rickert severed his connection on Dec. 31 with the Eastern Pennsylvania Railways, Pottsville, Pa.

Early in October Mr. Rickert resigned as assistant general manager and assistant secretary and treasurer of the Eastern Pennsylvania Railways and assistant general manager and secretary and treasurer of the Eastern Pennsylvania Light, Heat & Power Company. At that time Mr. Rickert agreed to remain at Pottsville until a new general manager was appointed.

Charles Remelius has resigned from the Peter Smith Heater Company, Detroit, Mich., to become assistant master mechanic of the New York State Railways at Rochester. Mr. Remelius has had a long experience with electric railways in mechanical work, having been connected with the Cleveland (Ohio) Railway, Detroit (Mich.) United Railway; Indianapolis Traction & Terminal Company, Indianapolis, Ind.; St. Louis (Mo.) Transit Company; Brooklyn (N. Y.) Rapid Transit Company, and the Public Service Railway, Newark, N. J.

F. J. H. Kracke has been appointed by Governor Whitman of New York to the Public Service Commission of the First District to succeed Col. William Hayward. He is to serve until the return of Col. Hayward from military duty. Mr. Kracke is one of the principal Republican leaders of Brooklyn. He has held the post of Commissioner of Plant and Structures, formerly Bridge Commissioner, in the Mitchell administration, and before that was Naval Officer of the Port of New York from 1906 to 1913. Mr. Kracke managed Governor Whitman's campaign in 1916.

W. T. Waters, former advertising manager of the Georgia Railway & Power Company, Atlanta, Ga., and editor of *Here We Are*, published by that company, is a first lieutenant in the Field Artillery and is stationed at Fort Logan, Houston, Tex. Mr. Waters entered the officers' training camp at Fort Oglethorpe three months ago, after many weeks of hard work on the draft exemption board. He was graduated far up in the A list of first lieutenants. Mrs. Waters, who held her husband's place as advertising manager during his absence in camp, will continue in that capacity.

Charles Bulkley Hubbell has been appointed by Governor Whitman of New York to the Public Service Commission of the First District to succeed H. W. Hodge. He is to serve until the return of Mr. Hodge from military duty. Mr. Hubbell was chairman of three subway commissions by appointment of the Appellate Division. He was the last president of the board of education before consolidation and the first president of the new board of the greater city, and is still chairman of the board of trustees of Hunter College and the College of the City of New York. He has been active in the alumni affairs of Williams College.

W. O. Minard has been appointed electrical engineer of the Rutland Railway, Light & Power Company and the Western Vermont Power & Light Company, Rutland, Vt. Mr. Minard entered the employ of the companies in Rutland about eight years ago as a lineman, in which capacity he worked for three years. He then resigned to become chief electrician of the Consolidated Light & Power Company, Whitehall, N. Y. After a year with this company, he returned to Rutland as electrician and substation repair man for the Western Vermont Power & Light Company and the Rutland Railway, Light & Power Company.

Stuart H. Patterson, who has been appointed comptroller of the Guaranty Trust Company, New York, a newly created office, has been connected with the American Water Works & Electric Company, as vice-president and treasurer, since its organization, in April, 1914. Mr. Patterson was born in New York City on Feb. 12, 1871, and on Jan. 1, 1887, he began his business career as an office boy in a wholesale dry goods house. In 1891 he went to Seattle, Wash., and learned some of the practical side of the electrical business. Mr. Patterson returned to New York in January, 1894, to join his father in the accounting business. He became a certified public accountant in 1896. Nine years later Mr. Patterson withdrew from the accounting firm of Patterson, Teele & Dennis to become associated with a bond house. In January, 1912, he became associated with the Guaranty Trust Company in an advisory capacity.

Fred Boeken has been appointed superintendent of the Municipal Railway, San Francisco, Cal., to succeed the late Thomas A. Cashin. Mr. Boeken has been assistant superintendent of the Municipal Railway since 1912. His



FRED BOEKEN

first railway experience began in San Francisco as a gripman on the old Market Street Cable Railway. Later he became inspector with the Geary Street, Park & Ocean Railroad, and in 1906 was made assistant superintendent of that company. This position he held until the line was taken over as part of the municipal system of San Fran-

cisco in 1912. He was then appointed assistant to Mr. Cashin. Included in the Municipal Railway are 45 miles of line over which more than 190 cars are operated.

J. B. Stewart, Jr., whose promotion from the position of assistant to the general manager to assistant general manager of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, was noted in the *ELECTRIC RAILWAY JOURNAL* of Dec. 22, has been



J. B. STEWART, JR.

with the company since 1913, when he became safety and efficiency engineer and superintendent of freight. Subsequently he was appointed superintendent of equipment and traffic and then was made assistant to Richard T. Sullivan, general manager. Mr. Stewart was graduated from the high school at Newton, Mass., and the Massachusetts Institute of Technology. His first employment in the electric railway field was with the Middlesex & Boston Street Railway, Newtonville, Mass., as an engineer, whence he went to Erie, Pa., as assistant to the general manager of the Buffalo & Lake Erie Traction Company. In 1910 he was engaged in the construction of the Corning division of the Elmira, Corning & Waverly Railroad, Waverly, N. Y., and two years later became park manager and acted as assistant to the traffic manager of the Lehigh Valley Transit Company, Allentown, Pa.

George A. Mills has been appointed electrical engineer of the Winnipeg (Man.) Electric Railway and subsidiary companies. Mr. Mills entered the engineering field after graduation from Iowa State College in 1909. The next fourteen months he spent with the Allis-Chalmers Manufacturing Company at its Bullock works, as an electrical apprentice. In 1910 Mr. Mills became a member of the instructing staff of the University of Pennsylvania, where he remained one year. In June, 1911, he became connected with the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, as electrical engineer, for which he had charge of the electric design and construction of the Cedar Rapids extension. He also was active in rebuilding the power station and other lines of this company.

Obituary

George E. Baker, chief mechanical expert of the Eastern district of the Westinghouse Traction Brake Company, died on Dec. 26 after an operation. For a number of years he suffered very severely from rheumatism, but never lost his courage or cheerfulness. Mr. Baker was born in New Albany, Ind., in 1865, and after serving his apprenticeship became an expert machinist. Twenty-five years ago he entered the employ of the Gennett Air Brake Company, Chicago, the first to specialize in electric railway air brakes, and continued in that line, joining the Westinghouse Company in 1901. Mr. Baker was widely known as dean of traction railway brake experts and was highly esteemed by all for his comprehensive understanding of his business and his unflinching kindness. He is survived by his widow and daughter.

Frank M. Mousseau, head bookkeeper in the auditing department of the Twin City Rapid Transit Company, Minneapolis, Minn., died suddenly on Dec. 27. Mr. Mousseau was born in 1873 and entered railway work in Minneapolis as a water boy when the first lines were being built. For several years he was a station timekeeper and for fifteen years had been in the auditing department. His father, Mitchell Mousseau, was in the employ of the company for thirty-three years. He was one of the first superintendents in Minneapolis. An uncle, Henry Mousseau, forty years with the company, was the first horse-car driver in Minneapolis. One brother has worked for the company twenty years and another five years. Horace Lowry, president of the company, said that he felt the Mousseau family were one of the rocks on which the company had been built, typifying as they did a fine loyalty and unswerving devotion to duty under all circumstances.

William H. Goble died suddenly on Dec. 25 while making a brief visit at the home of his youth in London, Ont. Mr. Goble left the farm in Canada in the earliest days of electrification of street railways and joined the car-equiping forces of the Thomson-Houston Company, working in Brooklyn and Baltimore. In 1893 he was employed in Brooklyn, serving as foreman of various surface and elevated shops until 1901, when he became a member of the Christensen Engineering Company's field force. He remained with the company and its successors, the National Brake & Electric Company, as sales engineer of its Philadelphia district until that company was taken over by the Westinghouse Traction Brake Company, and continued with them as mechanical expert and salesman in his old territory until his death. Beloved by all for his great-heartedness, he and George E. Baker, his friend of many years, will be sadly missed by all who know them. Mr. Goble is survived by his widow.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Franchises

Jacksonville, Fla.—The County Commissioners have granted the Jacksonville Traction Company permission to construct a line from Ortega to Camp Joseph E. Johnston.

Cedar Rapids, Iowa.—The Board of Railroad Commissioners has granted the Iowa Railway & Light Company a franchise to construct and operate an electric transmission line along certain roads in Benton County for the transmission of electricity for lamps, heaters and motors.

Track and Roadway

Pacific Electric Railway, Los Angeles, Cal.—This company is double-tracking its line between Baldwin Park and Hayes Station.

Municipal Railways, San Francisco, Cal.—M. M. O'Shaughnessy, city engineer, has awarded contracts for the ties, steel rails and other material required for the construction of the Parkside extension of the Twin Peaks tunnel system. Delivery will be made about Jan. 31 and it is expected that actual construction will be begun early in February. The line will be about 1 mile long and will extend from the west portal of the tunnel to Twentieth and Taraval Streets.

Southern Pacific Railway, San Francisco, Cal.—Plans have been prepared by Alameda County and the Southern Pacific Railway for the erection of a bascule bridge over the inner harbor of Oakland.

Colorado Springs & Interurban Railway, Colorado Springs, Col.—This company reports that during 1918 it will build 1 mile of new track and will reconstruct 4 miles of track.

Murphysboro & Southern Illinois Railway, Murphysboro, Ill.—Application has been filed by the Murphysboro & Southern Illinois Railway with the Public Utilities Commission of Illinois for permission to issue \$63,000 capital stock and \$250,000 in bonds. The company is building a line between Murphysboro and Carbondale and the new capital is desired to extend the line from Carbondale to Carterville or to Herrin. A. B. Minton, Murphysboro, president. [June 23, '17.]

Sioux City (Iowa) Service Company.—This company reports that it will reconstruct 2½ miles of track in 1918.

Wichita-Walnut Valley Interurban Railway, Wichita, Kan.—A contract has been awarded by the Wichita-Walnut Valley Interurban Railway to the Scott Construction Company, St. Louis, for the construction of its proposed line from Wichita to El Dorado and Augusta. It is probable that the line will leave the city east on Twenty-first Street to Andover, where a terminal will be built; thence one branch will lead to El Dorado and the other to Augusta. The El Dorado line will be built via Andover, Benton and Towanda. This part of the line will then be built to Augusta, connecting the two large oil fields. As soon as the road from Wichita to El Dorado and Augusta is completed work on the construction of a line from Augusta to Douglass and Winfield will be begun. Charles Payne, secretary. [Dec. 8, '17.]

South Covington & Cincinnati Street Railway, Covington, Ky.—During 1918 this company will rebuild 2.4 miles of track.

***New Orleans, La.**—An interurban railway from New Orleans, La., to Mobile, Ala., is in prospect if the Mississippi Legislature sanctions a bill that has been drafted and is ready for submission at the approaching session. The bill as it will be introduced proposes the authorization and empowerment of municipalities in Mississippi to own, construct and operate electric railways. The measure would authorize cities and towns to take over the Gulfport & Mississippi Coast Traction Company operating between Biloxi and Pass Christian at a fair valuation and extend it from New Orleans to the Gulf city. The bill is now in the hands of Mayor George M. Foot of Gulfport and will be presented early in the approaching session and rushed for passage. The purpose of the bill is to enable cities and towns in the State to combine and co-operate with each other in the ownership, construction and operation of the electric interurban railways. Supporters of the bill believe that, if passed, it will result in the construction of several interurban railway systems in Mississippi, especially in the sections where cities and towns are situated close to others, thus making interurban lines profitable.

Southern Traction & Utilities Company, Thibodaux, La.—It is reported that the Southern Traction & Utilities Company will construct the proposed line from Donaldsonville to Lockport, along the Bayou Lafourche, 56 miles. C. C. Barton, Albemarle, is president of the company, and others interested are Albert Boudreaux and L. C. Roger, Thibodaux; Walter Ohlmeyer, Plattenville; Dr. A. J. Price of the Lagarde Planting Company; Henry LeBlanc, Painscoutville, and Harold Raymond, New Orleans. Practically all the necessary

right-of-way has been obtained. Subscriptions to \$100,000 of the total capital stock of \$500,000 are sought from the people along the line, subscriptions for the other \$400,000 being assured as soon as the necessary indorsement of the population to be served is obtained. [Nov. 17, '17.]

Bay State Street Railway, Boston, Mass.—The new line extending on Quincy Street to the Fore River Shipbuilding Corporation has been opened for traffic. Washington Street, widened from 40 ft. to 66 ft. for a distance of 2 miles, now has double tracks, which connect with the double-tracked system in Hancock Street and run through Cleverly Court to the Fore River yard. The government will pay \$300,000 of the cost of \$350,000 and Quincy will pay the balance for land taking.

Boston (Mass.) Elevated Railway.—The government has nearly completed the big Victory Bridge over the Neponset River. When the work is completed the Boston Elevated Railway will operate cars direct to the Quantum works of the Fore River Shipbuilding Corporation.

Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, Minneapolis, Minn.—Plans for the reconstruction of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company's line from the Minneapolis terminal at Seventh Street and Third Avenue, N., to Northfield and Faribault, at a cost of approximately \$750,000 have been announced by C. T. Jaffray, president of the First & Security National Bank. C. T. Bratnober, who was receiver for the line, is in charge of the new plan. Mr. Jaffray and his associates on Dec. 19 bought that part of the line extending from a point near the Minnesota River to a junction with the Luce line near Glenwood Park for \$100,000. If the plan goes through it will mean that the road will be electrified for freight and heavy traffic as well as for passenger travel, and Minneapolis will then have a heavy electric line direct into the heart of southern Minnesota.

St. Cloud (Minn.) Public Service Company.—This company reports that it will build 1 mile of new track during 1918.

St. Louis, Mo.—The Municipal Bridge Commission has decided that the proposed rental of 1 cent per passenger carried by interurban cars for the use of the free bridge and municipal loop shall be eliminated and it will recommend to the Board of Aldermen that the city build a loop and maintain the bridge and loop tracks for one year without charge to street cars, to encourage interurban development.

Interborough Rapid Transit Company, New York, N. Y.—Announcement has been made by the Public Service Commission for the First District of New York that it is hoped to have the Lexington Avenue subway and the Seventh Avenue subway in full operation, in connection with the first subway, as soon after the first of

April as is possible. In the meantime, according to Frank Hedley, vice-president and general manager of the Interborough Rapid Transit Company, which will operate these lines, the earliest date at which partial operation may be expected is on or about March 1. The company plans to operate an alternate service of elevated and subway trains over both the Astoria and Corona extensions, beginning some time between Jan. 1 and Jan. 15. The date on which this service will begin depends upon the completion of work on some safety switches now being installed at the plaza in Long Island City.

Piedmont & Northern Railway, Charlotte, N. C.—An order has been placed by the Piedmont & Northern Railway with the Union Switch & Signal Company, Swissvale, Pa., for two small temporary interlockings at the entrances to the national cantonment at Camp Greene, Charlotte. Each plant includes a three-lever dwarf machine, and the signal indications will be controlled primarily by knife switches and selected over-circuit controllers on the levers of the machine.

Portsmouth Street Railroad & Light Company, Portsmouth, Ohio.—During 1918 this company will build 2 miles of new track between Portsmouth and Union Mills.

Sandwich, Windsor & Amherstburg Railway, Windsor, Ont.—James Anderson, manager of the Sandwich, Windsor & Amherstburg Railway, has announced that from \$50,000 to \$75,000 will be spent in the betterment of electric railway service in Windsor, providing the city will allow the company to construct the Ferry Avenue loop, which caused litigation extending over two years and resulted in the company being told by the courts that it could not build a loop without the consent of the ratepayers. The company's plan is to install a double curve at Sandwich Street and Ouellette Avenue, which would obviate the necessity of running belt line cars on the wrong side of Ouellette Avenue. Double tracks will also be laid on Ouellette Avenue from Park Street to Wyandotte Street. The proposal will be submitted to the Ontario Municipal & Railway Board, which will either order the work done or send recommendations to the City Council.

Montgomery Transit Company, Norristown, Pa.—A report from the Montgomery Transit Company states that during 1918 it will place in service 16.3 miles of new track, consisting of an extension from Harleysville to East Greenville, 12 miles, and from Harleysville to Souderton, 4.3 miles. The company will reconstruct 10 miles of track.

Johnstown-Somerset Traction Company, Somerset, Pa.—This company, which is constructing a line from Johnstown to Jerome, 10 miles, reports that it will probably build a 6-mile extension to Boswell.

Sioux Falls (S. D.) Traction Company.—About 1 mile of track will be rebuilt by the Sioux Falls Traction Company in 1918.

Dallas (Tex.) Railway Company.—Street car terminals will be constructed by the Dallas Railway at Fair Park to care for the heavy traffic incident to the Texas State Fair, formal approval of the plans of the company having been given by the Fair Park directors, the city park board, the supervisor of public utilities and the city commissioners. The company will construct a storage track along the Second Avenue side of Gaston Park and will also build a double-track line on Second Avenue to be a part of the Second Avenue extension. A crossover will be built through Gaston Park from Second Avenue to Exposition Avenue to take care of cars from the storage track to the loading station. The loading station will be entered through pay-as-you-enter gates, which will greatly facilitate the handling of large crowds. In return for these privileges, the Dallas Railway will deed to the City of Dallas the 30-ft. roadway extending from Gaston Park and Parry Avenue, known as Exposition Avenue, title to which is held in fee by the company.

Southwestern Traction Company, Temple, Tex.—The property of the Southwestern Traction Company, which operates a line between Belton and Temple, has been sold under order of the United States Court to F. W. Downs, Temple. It is stated that the company will be reorganized and important improvements made to the property.

Seattle, Wash.—The Puget Sound Traction, Light & Power Company recently made application to the City Council of Seattle for a franchise for a line to extend across the new steel bridge spanning the Salmon Bay Waterway at Fifteenth Avenue, N. W., and a second application for the right to discontinue service on the streets leading to the temporary bridge at Fourteenth Avenue, N. W., reached by the company over private right-of-way. The application for the bridge franchise was referred to the utilities and franchise committees. The bill granting the company operating rights on the second temporary bridge across the west waterway at West Spokane Street was passed by the Council. This right is to be enforced until a permanent bridge across the waterway is constructed, when the company will operate under a franchise granted many years ago by King County, before the annexation of that territory to the city of Seattle.

Seattle (Wash.) Municipal Railway.—The Street Department of the city of Seattle, Charles R. Case, Superintendent, has completed the grading for the Ballard extension of Division A of the Seattle Municipal Railway to the connection with the Loyal Heights Street Railway at Twenty-third Avenue Northwest, and West Sixty-seventh Street, and has laid the track within one block of the Loyal Heights line. However, delay in getting the material for crossovers will prevent operation of the line until the middle of January. The utilities and street department recently in-

ventoried the property of the Loyal Heights Railway, and made a report to the Board of Public Works. The purchase and transfer of the property to the city has been authorized as soon as the corporation counsel passes upon a satisfactory title. Acceptance of the Loyal Heights line by the city of Seattle will make it possible for the residents of that district lying along the Loyal Heights line from Market Street to the city limits at Thirty-second Avenue, N. W., and West Eighty-fifth Street, to reach downtown without a transfer, with but one fare.

Monongahela Valley Traction Company, Fairmont, W. Va.—This company reports that it will construct 4 miles of new track in the city of Fairmont and will rebuild 1 mile of track during 1918.

Shops and Buildings

Saginaw-Bay City Railway, Saginaw, Mich.—Fire recently destroyed a large section of the carhouse and thirty-five cars of the Saginaw-Bay City Railway.

Power Houses and Substations

Alabama Power Company, Anniston, Ala.—It is reported that the Alabama Power Company plans extensive improvements and additions to its Warrior River electric plant to provide power for the operation of the new cyanamid plant now in course of construction for the Government. The work is estimated to cost about \$3,000,000.

Chicago, Milwaukee & St. Paul Railway, Chicago, Ill.—Plans have been prepared by the Chicago, Milwaukee & St. Paul Railway for the construction of a substation at Renton, together with three bungalows.

Burlington Railway & Light Company, Burlington, Iowa.—The erection of a transmission line from Burlington to Mediapolis, Morning Sun, Wapello and Winfield is contemplated by the Burlington Railway & Light Company. The company has asked the City Council of Morning Sun for a franchise to furnish electricity to that city.

Public Service Railway, Newark, N. J.—The Board of Public Utility Commissioners of New Jersey has approved the application of the Public Service Railway for permission to issue \$1,250,000 of its capital stock at par to be used for extensions to its plant.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—The engineering department of the Puget Sound Traction, Light & Power Company is completing the installation of an additional penstock at the White River hydroelectric plant, which is about three-fourths completed. Foundations for the 16,000-kva. generator and water wheel have been placed. The plant when completed will cost about \$750,000.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Market Conditions of 1917 in Review

Industry Reaches Lower Limit of Purchasing Ability, While Prices Showed a Marked Upward Tendency—Brighter Outlook for the New Year

Within the year just closed manufacturers and supply men generally experienced the least electric railway buying of any year during the past decade. Fare increases and better rates for money were held to be necessary to equipment expenditures. The former was slow and the latter did not materialize.

Less rolling stock was ordered during 1917 than in 1916 by some 38 per cent. The mileage of new electric railway trackage was less than in 1916 by a little over 40 per cent. Since so many other items depend on these two and since 1916 was also a particularly bad year, it can easily be appreciated to what extent the railway supply market has suffered. Many manufacturers in this line have been forced to take government munition contracts in order to keep their plants going.

Where the manufacturers had other than street railway business to depend on an excellent business was handled.

ELECTRICAL TRADE \$750,000,000

Starting with a heritage from the previous year of a quarter of a billion of dollars of unfilled orders, the electrical manufacturing industry in 1917 far exceeded the record set in 1916 both in buildings and bookings. Although the country was engaged in war nine out of the twelve months of the year, the industry has shown on the whole no diminution of output but rather a very considerable increase. Careful and conservative estimates place the 1917 billings of electrical manufacturers in the near neighborhood of \$750,000,000, while unfilled orders at the close of the year were certainly not less than \$300,000,000. Thus the 1917 electrical manufacturing industry can be said to have passed the billion dollar mark.

Turbine production for 1917 was early sold out, and by the first of June, 1918 and 1919 production for large sizes had been booked, with orders running in 1920. The largest single order on record, 200,000 kw. in turbines, was placed in May.

Transformers and motors in large sizes were particularly hard to obtain after the middle of the year. Production has been booked far ahead. In the early fall it was estimated that manufacturers were 150,000 motors (of all kinds) behind orders.

The second-hand market flourished as never before during the year. High

prices prevailed. Dealers found it very difficult to secure equipment. Much of this equipment was ordered only until such time as new goods could be delivered. In this way some machines were sold and resold many times in the year.

ONE-MAN CARS POPULAR

In strictly electric railway material certain products did show a stimulus of sales. One-man cars, while by no means a new idea, grew considerably in popularity. They seemed to fit in well with economy of operation plans. Besides the sale of pay-as-you-pass cars grew considerably. Other equipment designed for repair work was in greater demand than ever before. Conditions were favorable to the sale of new fare collection devices in which there was particular progress.

Prices, except for certain raw materials, had an upward tendency throughout the year, but not to such a marked degree as in 1916. Glass and porcelain products increased, as did many other staples. As the year closed announcement was made of the first increase in the price of incandescent lamps. On the other hand, certain products, including wire, were lower in price as the year came to a close. Rails advanced considerably during the year, as did practically all car, track and line hardware.

METAL PRICES LOWER

In the raw-materials market the government price-fixing program, which found expression in September in lowering the price of copper and steel products, has been the dominating factor. Metal prices, except for tin and nickel, were much lower in December than in January. Following is a comparison of metal prices in New York during the first and last weeks of the year:

Copper:

London, standard spot.....	113 10 0
Prime Lake.....	29.00 to 29.50*
Electrolytic.....	28.00 to 29.00*
Casting.....	27.00 to 28.00*
Wire base.....	36.00 to 38.00
Lead, trust price.....	7.50
Nickel, ingot.....	50.00
Sheet zinc, f.o.b. smelter.....	21.00
Spelter, spot.....	9.67½ to 9.92½
Tin, Straits.....	42.75*
Aluminum, 98 to 99 per cent.....	55.00 to 58.00*
Heavy copper and wire.....	24.00 to 25.00*
Brass, heavy.....	14.50 to 15.50*
Brass, light.....	10.50 to 11.00*
Lead, heavy.....	6.50 to 6.62½*
Zinc, old scrap.....	6.00 to 6.25*

*Nominal. †None offering.

Two of the greatest difficulties that the trade has had to contend with during the past year have been labor shortage and transportation congestion. Both have handicapped production and deliveries. In the manufacturing industry there were fewer strikes and less serious ones than during 1916. Labor, however, was still roving. There was a serious shortage throughout the year in mechanics and similar skilled labor and in unskilled labor. Of the other large class of labor, however, statistics show a growing percentage of unemployed. After the war broke out the labor situation became worse. First, the army and navy took a large percentage of the male labor in the manufacturing industry, and second, the government, through cantonment construction and the shipyards, put a severe strain on labor by offering an opportunity to earn the largest wages on record in the United States for that kind of labor. In addition, the female labor supply apparently became less.

A large amount of female labor is employed in electrical manufacturing, and the scarcity has hampered production considerably. Higher wages were paid during the year and high-cost-of-living bonuses were given by manufacturers rather generally.

The only ray of hope in the labor market came in the winter months early in the year, when the closing of plants that had completed war contracts for Russia and other warring nations released large numbers of skilled workmen. The entrance of the United States into the war, however, made the demand for this kind of labor more acute than ever.

On Sept. 1 the child-labor law guarantee was demanded of dealers as well as manufacturers.

TRANSPORTATION DIFFICULTIES

Transportation congestion as the year opened was very bad, growing worse until the Eastern seaboard in March was in an almost hopeless condition. This was a great handicap to

Jan. 3, 1917	Dec. 24, 1917
£ s d	£ s d
113 10 0	110 0 0
29.00 to 29.50*	Govt. price 23.50
28.00 to 29.00*	Govt. price 23.50
27.00 to 28.00*	Govt. price 23.50
36.00 to 38.00	27.00*
7.50	6.25
50.00	50.00
21.00	19.00
9.67½ to 9.92½	7.67½
42.75*	85.00†
55.00 to 58.00*	34.00 to 36.00
24.00 to 25.00*	22.00 to 22.50
14.50 to 15.50*	14.00 to 15.00
10.50 to 11.00*	9.50 to 10.50
6.50 to 6.62½*	5.75 to 5.87½
6.00 to 6.25*	5.00 to 5.50

both buyers and sellers in deliveries already very long. Embargoes were placed on freight for export shipment and a lot of other material eastward bound. The lack of tonnage for export caused docks and warehouses to be filled to capacity, rendering the removal of goods still more difficult. During the summer months, however, the shortage in freight cars was decreased by about a third, but by September it was worse than ever. The transportation situation became still more serious until the government, feeling that private operation could not solve the problem, even with transportation priority orders, stepped in a few days prior to the end of the year and took over the control of all roads under Secretary McAdoo.

STANDARDIZATION

Standardization was urged during the year by both purchasing agents and supply men. A large amount of thought has been given to this subject in past years, but owing to the discontinuance of convention work by the American Electric Railway Engineering Association, no actual progress during the year, so far as the formal adoption of standards is concerned, can be reported. Informally, however, perhaps more progress in car standards was made during 1917 than in any previous year, because of the general acceptance by one-man safety car users of the Birney design.

The outlook for the new year, however, is considerably brighter. Prices, generally, seem to have gone about as high as they will go. Buying is expected to increase considerably. Roads have deferred purchases to the extent where they must of necessity be made soon.

Condition of Copper Wire Supply and Demand

Anticipated That the New Government Price on Copper Will Not Affect Price of Wire

Following the conference of the Board of War Industries with the producers of copper Dec. 14, it was surmised that a change in the price established several months ago might follow. As yet no change has occurred, and there is a division of opinion among authorities on the subject whether a revision will be made Jan. 1. One of the best informed experts is of the opinion that if a new price is announced it will be a higher one. Should this be so it will not affect the market on wire. Base remains at 32 cents to 34 cents.

There is a large demand for armored cable on order of the government for the submarines, and therefore it can only be promptly and efficiently met by the manufacturers direct. Code wire used in building construction, which is almost negligible, is also selling heavily for governmental work. Hard-drawn wire for leading-in wire and copper-clad for telephone and regular signal wire are being called for. Copper-clad is being used more than hard-drawn. Underground cable, made of oiled cambric

and lead-covered—power cables and feeders—is also in special demand, with heavy sales reported.

Deliveries are spoken of as fairly satisfactory, code going out of stock in large quantities. On steel-tape cable shipments can be made in from six to eight weeks, provided that the steel can be had. No positive promises can be made on these goods, delays being occasioned by the quantity and size designated. Primary hands are under the impression that not much wire is in the jobbers' stocks or with the distributing houses. It is believed that the copper situation is not so trying as it threatened to be a few weeks back. One jobber said that wire had loosened up and dropped a few points in price, and that deliveries were almost normal.

Supply Men Expect Freer Buying

Retrenchment Policy Has Been in Effect So Long That the Need for New Equipment Becomes More Urgent Daily

For a long period the accessories and supplies people have looked forward to a time when the railways would again be in the market. This state of affairs has not materialized, though there are indications of better buying than has been noted. The improvement, slight as it is, brings the thought to the front that it will be of a progressive nature, gaining momentum as it develops. That the railway companies have curtailed orders for new rolling stock, track maintenance and equipment in general to almost the vanishing point, is more than a twice-told tale. So far has this retrenching policy been carried, say the sales agents, that more than a few roads are now most inadequately supplied with equipment.

The supply branch of the trade is firmly of the opinion that purchases on a considerable scale must soon begin again. This thought has for its basis three conditions. The first is the largely increased traffic which most roads are reporting. The second is that a purchase not made is simply a purchase delayed and that in the meantime both track and cars are wearing out. In the third place, the supply men hope and believe that in general the pending applications for increased fare will be granted. This will mean that the roads will have the money, or the credit, which they have long needed to buy new equipment. Of course, prices are now high, but that is necessarily not a deterrent to purchases if there is no immediate prospect that the prices will go lower. There does not seem to be any immediate prospect of this.

Western companies are buying more freely of rolling stock than the Eastern roads. A "break" is looked for, and on this account, as much as anything else, an effort is being made to keep prices at the present level. The argument advanced is if the railways are not buying now, a further advance in price would certainly not be an inducement to bring them into the market.

Manufacturers Working Closer to Government

Possibility Exists, Should Volume of Orders Greatly Increase, of Allocating Work According to Factory Conditions

By working closer to the government through the electrical division of the War Industries Board the electrical manufacturers have been better able to know the government's needs and to take care of them. At present the manufacturers will receive lists of government requirements daily. However, should the demand become large in volume, it is contemplated that weekly allocations of orders shall be made.

Similar action was taken earlier in the year on a number of electrical supplies by manufacturers' committees. The results accomplished were much more satisfactory to the government and to the manufacturers than the previous method of awarding government contracts. Now there is a possibility of extending this plan to the entire industry. Through this procedure the government can obtain its requirements in the minimum time and at the minimum cost. Furthermore, no manufacturer is unduly loaded up with government work.

To buyers other than the government the results are desirable, for deliveries, while longer perhaps throughout the entire field, are nevertheless surer.

The demand for electrical goods for war purposes is increasing. Still, there appears to be an electrical manufacturing capacity in excess of direct government needs. Manufacturers are being asked by the War Industries Board whether the indirect demands from secondary sources will absorb the available capacity.

Freight Handling Opening Up on Pacific Coast

Smaller Roads Expected to Purchase Special Equipment Before Long

The steadily increasing possibilities in the freight business have opened up a profitable field for the electric railways of the Pacific Coast which has materially improved the outlook. It is as yet too early to expect orders for special equipment for freight purposes but at the present rate of freight business increase this can be expected from the smaller roads before long. The Pacific Electric Railway in southern California territory has developed the largest volume of freight business and the shops of this company have been busily at work on freight-handling rolling stock. Some smaller lines have practically all the freight business they can handle. This has developed still more rapidly since the gondola car embargo went into effect, particularly in agricultural districts. The heavy crops that have been gathered in most all lines this year are helping materially to swell the freight traffic.

Rolling Stock

New Jersey and Pennsylvania Traction Company, Trenton, N. J., is reported as contemplating buying some new cars. It has already inquired for part of the equipment.

Saginaw-Bay City Railway, Saginaw, Mich., by fire had destroyed thirty-five cars together with a large section of the carhouse. The loss is placed at \$200,000. Street car traffic was paralyzed for several hours following the fire.

Southern Public Utilities Company, Charlotte, N. C., and the Montgomery Light & Traction Company, Montgomery, Ala., have recently changed a number of their open-end cars to the prepayment type. The work was done in the shops of Perley A. Thomas, High Point, N. C.

Tacoma Railway & Power Company, Tacoma, Wash., is reported as having purchased ten motor cars, costing \$3,000 each, f.o.b. Tacoma. The cars have 57 hp. each and will seat fifty-two passengers. Additional cars of the same type will be acquired for the Tacoma Municipal Railway, known as the "Tideflats" line.

Moscow (Russia) Tramway Company, through an agent now in New York, N. Y., is negotiating for brakes with the Westinghouse Traction Brake Company, Pittsburgh, Pa., for fifty motor cars. The cars are to be built by a Japanese company at Darien, South Manchuria, China, the agent here only placing orders for trucks, motors and air-brakes.

Cleveland (Ohio) Railway is reported as having bought twenty-five new all-steel cars, costing \$8,000 each. They weigh 31,900 lb. as against the 45,000 lb. of the half-steel, half-wood cars now in use. The cars of the new rolling stock are 50 ft. long, seating fifty-three persons, with front entrance and side exit. Larger and plainer signs are also fixtures. The purchase was authorized by the City Council some time ago. These are the first all-steel cars to be introduced in Cleveland.

Union Railway, New York, N. Y., which operates in the Borough of the

Bronx, and is controlled by the Third Avenue Railway Company, in order to comply with the recommendation of the Public Service Commission of the First District, is reported as being obliged to build its own snowplows. The commission suggested light new efficient plows be provided by the company, to properly combat the winter storms, but as the snowplow manufacturers are in no position to make early, let alone immediate, delivery, it is obliged to construct, out of rolling stock on hand, plows that will answer the purpose temporarily.

New Advertising Literature

Poole Engineering & Machine Company, Baltimore, Md.: The company is distributing its bulletin No. 100, descriptive of its turbo gear.

Walter A. Zelnicker Supply Company, St. Louis, Mo.: Bulletin No. 232 lists the company's latest offerings of engines, boilers and general supplies.

De La Vergne Machine Company, New York, N. Y.: Large practical calendar for 1918, has accompanying illustrations of the company's products, arranged in striking form.

Titanium Bronze Company, Inc., Niagara Falls, N. Y.: A pamphlet, "Phosphor Bronze Castings," describing and illustrating its products in this line and its experience in the compounding of brass and bronze alloys.

Rubber Insulated Metal Corporation, Plainfield, N. J.: Illustrated four-page circular, dealing with the company's Rimco rubber insulated pliers, which it states were tested and passed for 10,000 volts by the Electrical Testing Laboratories of New York, N. Y.

Youngstown Sheet & Tube Company, Youngstown, Ohio: The company is distributing a very attractive calendar for 1918. It is featured by twelve large two-color illustrations of as many different operations in the manufacture of iron and steel. The plates were made from photographs taken in the works of the company and are both handsome and instructive. The calendar will be sent to any address on receipt of 4 cents in stamps to pay cost of mailing.

Trade Notes

Perley A. Thomas, formerly chief engineer of the Southern Car Company, has now established a business for himself in High Point, N. C. Mr. Thomas has had many years experience in car work of all kinds.

Ridgway Dynamo & Engine Company, Ridgway, Pa., announces the appointment of the Blake Electric Manufacturing Company, No. 1 Rowe's Wharf, Boston, as its sales representative for the New England states.

Blaw-Knox Company has closed its Philadelphia office for the present and Mr. Pulis, who has been in charge, is transferred to its San Francisco office, to take the place of Mr. Burrows, who is going into the service of the government.

W. C. Carter has been placed in charge of the sales office at Grand Rapids, Mich., of the Westinghouse Electric & Manufacturing Company for the handling of western Michigan business. This office is under direction of the company's Detroit office.

Brown Company, Portland, Me., formerly the Berlin Mills Company, has acquired the property and business of the Burgess Sulphite Fiber Company. The new company will be carried on under the same control and management as heretofore, dealing in, among other things, a line of fiber conduit.

Electric Storage Battery Company, Philadelphia, Pa., has recently completed an eight-story reinforced concrete building. The buildings contain more than 20 acres of floor space. The yard space covers an area of 4 acres. and tracks from two railroad lines run directly into the yards of the works.

W. G. Lawrence has opened an office in the Spitzer Building, Toledo, Ohio, to engage in electrical engineering, and will make a specialty of power plant designing, steel lighting and supervision of construction and electrical installations. One of the associates of Mr. Lawrence is H. A. Seward, who recently came to Toledo from Chicago to join this firm. Mr. Lawrence, also a Chicago engineer, established himself in Toledo several years ago.

RAILWAY MATERIAL PRICES

	Dec. 24	Jan. 3
Rubber-covered wire base, New York, cents lb.	32.34	30
Wire, weatherproof, cents per lb., New York.	34 3/4-38	34 1/4-38
Wire, weatherproof, cents per lb., Chicago...	38-38.35	38-38.35
Rails, heavy, Bessemer, Pittsburgh.....	\$38.00	\$38.00
Rails, heavy, O. H. Pittsburgh, per gross ton.	\$40.00	\$40.00
Wire nails, Pittsburgh, per 100 lb.....	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.....	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.....	\$4.50	\$5.00
Sheet iron, black (24 gage), Pittsburgh, 100 lb.	\$5.80	\$5.80
Sheet iron, galv. (24 gage), Pittsburgh, 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl..	\$2.22	\$2.22
Cement (carload lots), Chicago, per bbl....	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.....	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, gal.	\$1.26	\$1.26
Linseed oil (boiled, 5 bbl. lots), New York, gal.	\$1.27	\$1.27
White lead (700 lb. keg), New York, cents gal.	10	10
Turpentine (bbl. lots), New York, cents gal..	47 1/2	48 1/2

*Nominal.

NEW YORK METAL MARKET PRICES

	Dec. 24	Jan. 3
Copper, ingot	23 1/2	23 1/2
Lead, cents per lb.....	6 1/2	6 1/2
Nickel, cents per lb.....	50	50
Spelter, cents per lb.....	6.35 7.82 1/2	7.92 1/2
Tin, Straits, cents per lb.....	*85.50	*85.50
Aluminum, 98 to 99 per cent, cents per lb....	36	36

OLD METAL PRICES—NEW YORK

	Dec. 24	Jan. 3
Heavy copper, cents per lb.....	22	22
Light copper, cents per lb.....	19 1/2	19 1/2
Red brass, cents per lb.....	17 1/2	17 1/2
Yellow brass, cents per lb.....	14 1/4	14 1/4
Lead, heavy, cents per lb.....	5 1/4	6.00
Zinc, cents per lb.....	5	5 1/2
Steel car axles, Chicago, per net ton.....	\$44.00	\$42.42
Old car wheels, Chicago, per gross ton.....	\$34.00	\$35.00
Steel rails (scrap), Chicago, per gross ton..	\$34.50	\$33.00
Steel rails (relaying), Chicago, per gross ton.	\$55.00	\$55.00
Machine shop turnings, Chicago, per net ton..	\$17.25	\$17.50



Peacock Improved

On the Peter Witt Cars at Buffalo

The one hundred new Peter Witt cars at Buffalo will make a hit because they promote the **quick** handling of passengers.

The Peacock Improved Brakes on these one hundred cars will make a hit because they promote the **safe** handling of passengers.

The Peacock Improved is excellent for any front-entrance car because of its compactness.

There is a Peacock for any and every character of electric railway car. Let us help you pick just the right one for your service.

National Brake Company

Ellicott Square, Buffalo, N. Y.

Bankers and Engineers

Electric Railway, Lighting and Power Company Bonds

ENTIRE ISSUES PURCHASED

THE NATIONAL CITY CO.

NATIONAL CITY BANK BUILDING N. Y.
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ENGINEERS
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105 SOUTH LA SALLE STREET
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Arthur D. Little, Inc.

Our chemical control of electric properties provides not only tests of fuel, lubricants, water, wire, bearing materials, etc., but also specifications for purchases, as well as constant research for betterment and economy in supplies and in operation. Successful experience in this work for many years warrants us in inviting correspondence and bidding visitors welcome to acquaint themselves with our methods of service.

93 Broad Street, Boston, Mass.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

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ROBERT W. HUNT & CO., Engineers

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Industrial Plants and Buildings, Steam Power Stations,
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NEW YORK APPRAISALS BOSTON

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AND RATE INVESTIGATIONS

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
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HYDRAULIC DEVELOPMENTS

PHILADELPHIA, PA.
GAS WORKS
ELECTRIC RAILWAYS

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DETECTIVES

Suite 715
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The Standard Paving Pitch

NOT every pitch is suitable for paving. Roofing-pitch, for example, would not do at all, although it looks much the same and contractors sometimes attempt to use it on the theory that it is the same thing.

A good paving-pitch will last as long as the pavement—that is to say, twenty or thirty years—and at the end of that time it will be exactly as good as new and fit to use once more in a new pavement if it were worth while to take it off the old blocks.

The Barrett Company has been manufacturing Paving Pitch for something like forty years. We can photograph almost any old pitch-filled pavement and be fairly certain that when we look it up we will find that the pitch in the joints is a Barrett product of a generation ago.

Contractors who use Barrett's Paving Pitch know that it does not bubble and boil over in the kettle. That means that it is free from water and the lighter oils. They find that it holds its heat well and is easily handled by unskilled labor. They find that when hot it is just the right consistency to flow easily into the joints and form a waterproof seal, without, on

the other hand, being so liquid that it runs through to the gutters.

In short, they find that Barrett's Paving Pitch is made especially for their use with all their practical difficulties in mind.

The municipal engineer who specifies Barrett's Paving Pitch knows that he can identify the goods by the label on the job. He knows that he is getting a standard product with forty years of experience to back it up; he knows that it is the same material that has made good in lots of other pavements which he knows of elsewhere.

In preferring pitch to cement or sand, the municipal engineer knows that he will get a pavement where every joint is an *expansion-joint*; a pavement in which cracks, breaks, blow-outs are unknown and impossible; a pavement that will not expand and thrust the curbing out of line or damage tracks or manholes; a pavement, in short, that will always be a credit to his management.

The standard pitch is Barrett's Paving Pitch. Look for the label on the barrels.

Booklets on request. Address our nearest office.

The Barrett Company

New York	Chicago	Philadelphia	Boston	St. Louis
Cleveland	Cincinnati	Pittsburgh	Detroit	Birmingham
Kansas City	Minneapolis	Nashville	Salt Lake City	Seattle
Peoria				
THE BARRETT Co., Limited: Montreal Toronto Winnipeg				
Vancouver	St. John, N. B.	Halifax, N. S.	Sydney, N. S.	



Second Street, looking east from Elm Street, Fort Madison, Iowa. Brick pavement filled with Barrett's Paving Pitch

LINE Summit Ave. DATE 7-22-1917
 LOCATION Pennsylvania Ave.
 NORTH EAST SOUTH



NACHOD

Headway Recorders Have Helped to Perfect the Fort Worth Service

This sheet is the kind of record the Northern Texas Traction Company gets of the car-spacing conditions on its lines, including the Summit Avenue line, which is making such great history in Safety Car Operation.

Accuracy in making time-points and equal loading of cars is indispensable to the highest standards of service.

The Nachod Headway Recorder, by giving you a daily history of car movements, will enable you to find the weak spots in your present service—whether they are due to causes *within* or *without* your control.

Nachod Signals and Crossing Bells have made a name for themselves.

Nachod Signal Co.
INC.

4773 Louisville Ave.
Louisville, Ky.



SPEED with SAFETY

Regardless of Weather

C-H-A-P-M-A-N Track Relay Signal System

The Chapman Track Relay Signal System gives you exactly what you have been looking for.

A system of almost the same low cost as trolley contacts, but with the freedom from speed and weather limitations common to elaborate track circuit equipments.

The reason is that in the new Chapman system the signals are set by the passing of the car wheels over an insulated track of suitable length and location.

THEREBY ELIMINATING: slow-downs required in approaching trolley contact signals. Distortion of contacts when approaching at high speed in spite of orders.

Eventual failure of distorted contactors to register signal indications.

Unreliability of trolley contactors because of snow, ice and sleet.

High cost and inconvenience of contactor maintenance, whereas the Chapman track relay can be placed in an accessible weatherproof box and demands no upkeep except occasional replacement of electrolyte.

THE CHAPMAN SYSTEM IS ALSO EASILY ADAPTED FOR USE AS A CROSSING SIGNAL.

Please write us direct for full particulars.

Charles N. Wood Co., 14 Federal St.,
Boston, Mass.



Latest Van Dorn Radial M. C. B. Coupler with Draft Gear

For Interurban Service

THE VAN DORN No. 880 M. C. B. COUPLER WITH DRAFT GEAR as shown above is well balanced and has the greatest strength possible for its weight.

COUPLER HEAD

Has positive locking, unlocking, and knuckle throw positions.

Has extended guard arm and butting wall which greatly facilitate coupling and prevent buckling in train operations.

Couples by impact and is uncoupled from the outside of the car.

The deep knuckle permits wide, free vertical movement.

DRAFT GEAR

The draft gear is very effective in absorbing shocks. It allows a free radial swing of over 120 degrees, which insures operation without binding on short radius curves.

This equipment is especially adapted to low interurban cars.

VAN DORN COUPLER COMPANY, 2325 South Paulina Street, Chicago

When Peace is Signed

THE nations of the world will embark upon the most extensive scheme of reconstruction ever inaugurated in the history of the world. Railways, steamers, factories and agricultural implements will be needed at short notice in quantities that stagger imagination. Raw materials will change hands in thousands of tons where formerly 1000 lb. orders were a fair average.

The demand will be sudden; it will be overwhelming.

The only manufacturers to benefit will be those whose names and products are *known*, and who are *now* announcing their abilities to fill large orders.

THE specialized field covered by this magazine will be second to none when the great drive for trade conquest begins—and the advertiser whose name appears regularly in its pages will be a few jumps ahead of his competitors whose names are strangers to it.

Do the big purchasing agents know you? Have they card-indexes of your ads, your catalogs?

If you are a regular advertiser in Electric Railway Journal you may be sure that they know all about you and your product when the moment comes for placing those rush orders!

Electric Railway Journal

Member Audit Bureau of Circulations

Drew Overhead Line Material

Will Make Your 1918 Appropriation Go Farther

All Drew Overhead Line Material helps you affect worth-while economies in your operating and maintenance departments. Drew Clinch Ears, Frogs and Crossings give you maximum mileage at minimum cost.

During these times when every dollar should do double duty, Drew quality will be thoroughly appreciated on your lines.



SAMSON Splicers and Splicing Ears Are Saving for Other Roads

Are they for yours?

If not, this will be a splendid time to prove to yourself, and enjoy the savings.

Samsons cost little to install—when once in place they are there for the life of the wire. No arcing—no hard spots. Samsons are easy on the trolley wheel.

Whether you have one mile or a hundred—Samsons will demonstrate their money saving ability.

Why not give them a trial?

The Drew Service Department is waiting to co-operate with you in securing the utmost service efficiency from every dollar spent for overhead. Why not get the benefit?

Drew Electric & Mfg. Co.

Offices—Indianapolis, Ind.—Works

District Representatives in Principal Cities

**DREW OVERHEAD LINE MATERIAL IS STANDARD ON
KEENLY MANAGED ROADS—GET QUOTATIONS**

DREW POLE SLEEVES

Solve The Steel Pole Problem at Low Cost

Make old steel poles good as new. Save time, money and labor wherever there's a steel pole on your property.

Investigate.



Storage Batteries

in

Electric Railway Service

LOAD REGULATION

For carrying peaks and fluctuations of load, especially in connection with water-power developments or where power is purchased on the basis of maximum demand, the "**Chloride Accumulator**" or the "**Tudor Accumulator**" is adapted.

LINE REGULATION

Due to the present high price of copper there are cases where the use of a battery for maintaining voltage is more economical than the purchase of copper for feeders. The "**Chloride Accumulator**" has been largely used in this service by many railways.

STANDBY SERVICE FOR EXCITER BUS

It is standard practice to install a storage battery connected to the Exciter Bus to prevent interruption in the supply of current for field excitation. Either the "**Chloride Accumulator**," the "**Tudor Accumulator**," or the "**Exide**" Battery can be used.

OIL SWITCH SERVICE

Storage batteries are used in power houses and sub-stations for the operation of oil switches and supplying current for pilot lamps and emergency station lights in case of failure of the power supply. For this service the "**Chloride Accumulator**," the "**Tudor Accumulator**," and the "**Exide**" Battery are used.

STORAGE BATTERY STREET CARS

For infrequent service or for conditions where trolley wires are prohibited, storage battery cars offer the most economical and profitable solution of the transportation problem. The "**Hycap-Exide**" Battery has been largely used in this service. In New York City alone there are in operation nearly 200 storage battery cars equipped with "**Hycap-Exide**" Batteries.

MULTIPLE-UNIT CONTROL

The "**Exide**" Battery and the "**Tudor Accumulator**" are used by a number of railways for furnishing a supply of low voltage current to be used in connection with the operation of multiple-unit control systems.

INTERURBAN CAR LIGHTING

A number of interurban electric railway companies have installed batteries on their cars to maintain steady illumination and to overcome fluctuations caused by changes in line voltage, interruptions in third rail at crossings and switches or by temporary failure of power supply. For this service the "**Exide**" Battery is particularly adapted.

HEAD AND TAIL LIGHTS

The "**Exide**" Battery is being used in connection with head lights and tail lights for furnishing current in case of interruptions in power supply.

Detailed information on batteries for any of the above services can be secured from any sales office of the company.

THE ELECTRIC STORAGE BATTERY CO.

Manufacturer of

The "**Chloride Accumulator**", The "**Tudor Accumulator**",
The "**Exide**", "**Hycap-Exide**", "**Tbin-Exide**" and "**Ironclad-Exide**" Batteries

New York Boston Chicago Washington PHILADELPHIA, PA. Rochester Detroit Minneapolis St. Louis
Cleveland Atlanta Pittsburgh 1888-1918 San Francisco Denver Kansas City Toronto

The market for good transportation service at fair prices is greater today than ever

THE peculiar conditions now surrounding the traction business present striking examples of the inexorable working of the law of compensation.

In the face of a "sellers' market" for nearly every other commodity, the purveyor of traction service faces a "buyers' market."

In almost every general line of business the seller is delivering what, when and how, it pleases him to deliver, at almost any price it pleases him to charge.

The electric railway company is being forced to deliver a constantly better product with a constantly mounting cost at a price which the buyer fixes.

Under these circumstances it is not surprising that the electric railway industry forgets that during many years, when other lines of business were struggling for meager profits, the electric railway industry was having everything its own way, the sellers of transportation were enjoying absolute domination of the market, the buyer (the

public) was eagerly accepting whatever service it could get on any terms the seller chose to name.

Those days of joyous opulence and arrogance for transportation sellers have been gone now these many years and the dominant spirit of electric railway companies today is one of superior service and strict economy for a rate that will yield a fair return on investment.

Had the progress in the changing of the old order of things been simultaneous throughout the whole industry and had it been accompanied by the vigorous continuous education of the public, it is highly probable that the complexion of things would now be vastly more satisfactory and profitable for the electric railway industry as a whole.

Unfortunately, this progress was "spotty," halting, and the element of the education of the buyer was and still is sadly neglected.

The buyer, still finding a few instances of the reactionary tendency, looks with suspicion on the goods deliv-

ered and the prices charged and in the absence of full and sufficient information as to the real facts harbors the ancient suspicion and grudge.

It seems then manifest that what is frequently called "the trouble with the electric railway industry" is simply a state of mind.

First a state of mind of some operating companies which are not perfecting service and achieving economies to the full extent of possibility; and second, a state of mind of the public due to ignorance and prejudice which the industry has not yet taken sufficiently vigorous means to remove.

**Here is no place for
pessimism, doubt, or foreboding.**

**What is needed is
vigorous, concerted, continuous action.**

Great strides have been made in rendering better service at lower costs of operation.

The public is learning, and is getting a clearer vision of traction problems and a more thorough idea of the true relation of the electric railway to the public.

Both of these elements in progress can be tremendously speeded up. Action to that end is the most pressing and important business of every company, every manufacturer, and every educational factor in the field.

Much of encouragement for such action exists in the tendency toward fare increases, as shown by the rulings of various public service commissions. As such increases are granted they will afford the opportunity for better service to the public.

Not less important, from the standpoint of earning power, is the great

opportunity for development of freight business which now confronts the industry.

The market for transportation service is greater than it ever was and is constantly growing. The opportunities for the exploitation of that market on a sound, economic, business-like basis are continually growing. If the latent energy of the industry is used to anything like its possible power, this present cloud of ignorance and prejudice will quickly pass, the chill of inertia will melt away and the electric railway industry will come into the broad sunshine of prosperity.

The deadliest policy the electric railway company or the manufacturer serving the field can adopt is a policy of drifting.

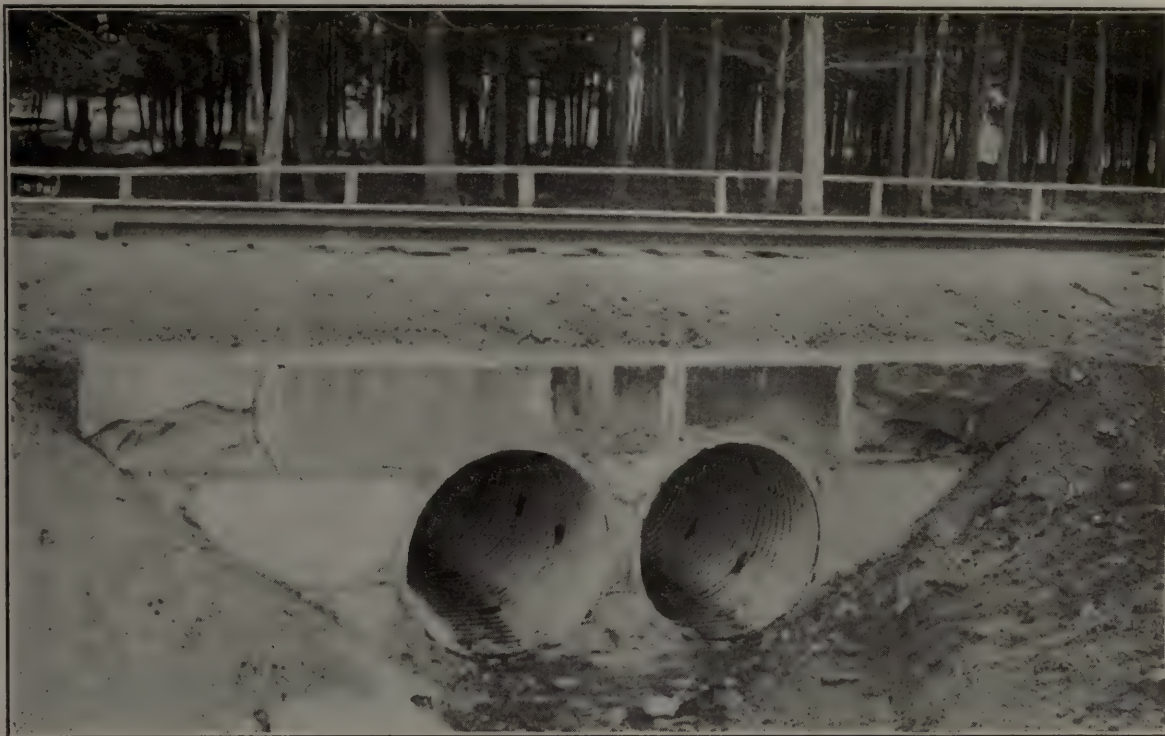
"It is always easy to get unanimous consent to do nothing."

Electric Railway Journal

Tenth Avenue at 36th Street

New York

Member Audit Bureau of Circulations



ARMCO IRON CULVERTS

Give Long Service Under Trying Conditions

The exceptional strength of their joints and the corrugated construction give great mechanical strength and resiliency in "Armco" Iron Culverts.

Because of the purity and evenness of "Armco" Iron, rusting is reduced to the minimum. "Armco" Iron Culverts resist rust—and give long and faithful service—because the elements that cause rust in iron or steel have

been reduced to the lowest point known to the industry.

Great mechanical strength and durability, combined with the ability of "Armco" Iron Culverts to **remain** in the position in which they are installed, even when floods have washed away the roadbed, are the reasons why "Armco" Iron Culverts give

Maximum Protection at Least Cost

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Company
California, West Berkeley
California Cor. Culvert Company
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neill Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Cor. Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Baltimore
Wm. M. Baker, Munsey Building
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Bark River Bridge & Culvert Co.
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Montana, Missoula
Montana Culvert Co.

Canada—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary.

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Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.

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Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal Works
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Cul. & Flume Co.
Virginia, Roanoke
Virginia Metal & Culvert Co.
Washington, Spokane
Spokane Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.



Write to the nearest manufacturer for full information on Rust-Resisting "Armco" Iron Culverts, Flumes, Siphons, Sheets, Roofing and Formed Products



The Truly Continuous THERMIT

Promotes Both Efficient Line Voltage

Whatever we have said in the past concerning the elimination of waste in the return circuit applies with multiplied force in these days of fuel cost and fuel scarcity.

You would not tolerate leaks in a boiler.

Then why tolerate leaks in track?

Every joint in your track is an actual or potential leak of energy that can be prevented permanently only by making the rail truly continuous.

This continuity has been achieved to a most successful extent with the Therman Insert Weld at Los Angeles, San Antonio, Youngstown, Pittsburgh, Dallas, New York and other cities.

You can secure the same results in your city regardless of temperature and traffic conditions.

Read the Following Record of These Ideals with



329-333 Folsom St., San Francisco

GOLDSCHMIDT

120 BROADWAY

7300 So. Chicago Ave., Chicago

Rail Obtained With WELDS

and Comfortable Passenger Car Service

The Thermit Insert Weld has made the mechanical joint an **unnecessary** evil.

When you use Thermit Insert Welds you do not have to worry about the inevitable arrival of the dished joint despite most careful grinding and matching up at the installation of new rails.

You **begin** with a smooth and truly continuous track, and you **keep** it.

The pounding that so quickly breaks up your paving and sub-structure is thus made negligible.

But above all this is the fact that a truly continuous rail means more comfortable riding for your passengers and less maintenance for your cars.

How One Railway is Attaining Thermit Welds

THERMIT CO.

NEW YORK

103 Richmond St., W., Toronto, Ont.

1427-1429 Western Ave., Pittsburgh, Pa.



This Record of

On the Third Avenue Railway System

Thermit Welds Made Good

The first Thermit Welds were made by our own men during 1914 on the busy Third Avenue Line between Fifty-sixth and Fifty-ninth Streets to the number of fifty in new 7-in. rail section 429. Half of these welds were made with inserts and half without inserts in accordance with the design of E. M. T. Ryder, Engineer of Maintenance of Way, Third Avenue Railway System. Neither class of Thermit Weld has developed any breaks to date.

A Thermit Weld Modification for Conduit Track Makes Good

The Ryder modification was developed to meet a condition peculiar to slot-rail conduit construction. New rails come drilled every 2.5 ft. for tie-rods which pass through the slot-rails so that the running rails cannot be conveniently moved to provide a $\frac{3}{4}$ -in. gap for an insert weld. Therefore, a butt weld is made as follows: The rails are left in contact end to end, but the lip is cut off to obtain a symmetrical section and the base and web are also cut away with oxy-acetylene for a gap of $\frac{3}{4}$ in.

The second order of Thermit Welds was installed by our own men in 1914 during severe winter weather (10 deg. above zero) and at night. Some twenty-five welds were made under these conditions in old rail section 404 on the Bowery between Chatham Square and Bayard Street. There have been no breaks to date.

Continue the Installation



Bowery, Between Chatham Square and Bayard St.



Broadway, Between 45th and 59th St.



329-333 Folsom St., San Francisco

GOLDSCHMIDT

120 BROADWAY

7300 So. Chicago Ave., Chicago

Thermit Welds

of New York Explains the Reorders on Old Rail and New

The third order of Thermit Welds was installed in 1915 by the railway's employees on Broadway between Forty-fifth and Fifty-ninth Streets, also in old rail section 340. Here some 50 to 100 welds were made on 5 ft. "dutchmen" to replace severe breakage of cast-welded joints. From this extremely busy section only two breaks are reported.

The fourth order, placed in 1916, covered 400 to 500 Thermit Welds on Third Avenue between Thirty-fourth and Fifty-sixth Streets in rail section 429. On this job, made by Third Avenue men under a Thermit supervisor, only two breaks are reported to date.

The fifth order of Thermit Welds comprised 355 Welds made in 1917 and divided in two installations, both of which were made by the railway's own men.

One was in new high-carbon rail section 493 on Broadway between Seventy-second and Ninety-sixth Streets; the other was in section 494 on the Union Railway's Southern Boulevard line between 149th and Baretto Streets. Exclusive of failures due to poor workmanship, so few breakages have been reported that the Third Avenue Railway System intends to

of Thermit Welds



Broadway. Between 72d and 96th St.



Southern Boulevard, Between 149th and Baretto St.

THERMIT CO.
NEW YORK

103 Richmond St., W., Toronto, Ont.

1427-1429 Western Ave., Pittsburgh, Pa.



If You Can't Raise Your Revenue You Can Reduce Your Expense By Eliminating Joints With the Atlantic Welding Process

A continuous rail is important mechanically for less wear and tear on track, lower pavement upkeep, easy running and reduced maintenance of cars.

A continuous rail is important electrically for insurance against electrolysis, for eliminating the upkeep and replacement of bonds and for retaining the highest, most economical voltage.

The Atlantic Welding Process

(Patented)

gives joint and bond in one

At a cost far below that of any other equipment for permanently satisfactory service and with such great convenience that perfect welds are being made at the rate of



**2 to 2½
welds per hour
with two welders.**

**And between
cars on 3-minute
headways.**

These three pictures



show the
application of

Gailor Welded Joints

(Patented)

on standard
track construction.

In applying the Gailor Welded Joint, the plates are welded to the head and base of the rails by drawing a carbon arc along the upper and lower edges of the plates.

The current for welding is furnished by an 1100 lb. dynamotor, not a wasteful resistor. This

dynamotor converts the line voltage to proper welding voltage with an efficiency in excess of 80 per cent. The power consumption per joint approximates 5 kw.-hours. Perfect Welds more than $\frac{1}{2}$ in. deep are made at the remarkable speed of 6 in. per minute.

by the forces of the Railway Company itself

We can reduce your arc welding costs. Write us for details.

**ATLANTIC WELDING
COMPANY**
30 CHURCH STREET
NEW YORK

TITANIUM

Titanium Treatment diminishes your paving and Rail Replacement Burden

For paving replacement alone, the electric railways of America pay an annual tribute of millions of dollars.

By using Titanium-treated rail to extend the period between replacements, particularly

on curves, special work and congested track

where the ordinary rail often wears out in months rather than years, our customers are not only enjoying important savings in reduced rail and paving replacement charges—

But are also minimizing delays to traffic at the very places where such delays are most disturbing and most costly.

TITANIUM
Manufacturing
Niagara Falls



— Brooklyn — Boston — Kansas City — L
San Francisco — Washington. (*Capital Traction*)
TITANIUM-Treated Rail

TITANIUM

Titanium Treatment costs relatively less as RAILS GROW DEARER

T-Rail is being quoted now at \$60 a ton and girder rail at \$70 a ton.

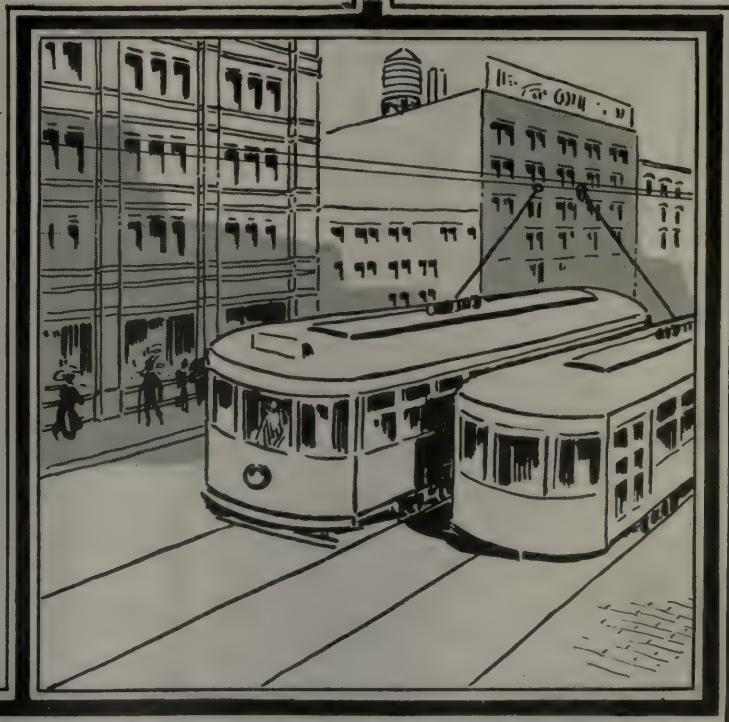
This means that at \$2 a ton Titanium insurance for longer, safer life and more reliable transportation is less than 3 per cent of the cost of the rail, whereas it was 5 to 7 per cent of the rail cost in 1913.

If Titanium was worth a premium of 5% then it's surely worth 3% now

Considering also, that steel rails, because of present war and future rehabilitation demands, are very unlikely to drop in price—

The inescapable conclusion is that every hard-wear rail ordered today should be Titanium-treated to avoid paying further excess prices before normal conditions are restored.

ALLOY
Company
Y.



Los Angeles — Philadelphia — Pittsburgh — San Francisco —
(.) are among the contented users of
won't you ask them?



Use Lincoln

For Less Coal at the Plant and Less Labor on the Track

This clipping may be gratifying to electric railway men in proving that street car transportation is regarded as the most important activity in a modern city.

But electric railways will soon have to *prove* to Fuel Administrator Garfield that they are not wasting any of the fuel received under this preferential arrangement.

There are many possible technical and human wastes of power—and therefore of coal—on any railway. The technical waste that can be detected most easily and removed most quickly is the poorly bonded rail joint.

To correct this permanently and economically you can use nothing better than the Lincoln Welded Bond.

The Lincoln System does not merely stick a bond to the rail. It so coalesces bond and rail that they are as *one* electrically and mechanically.

The Lincoln System is consistent and efficient in its use of power for applying the bond—it doesn't waste energy in undertaking to save it.

The Lincoln System is also so conveniently portable that one or two men can work efficiently without calling for a transportation crew and without holding up traffic—even on pretty busy city lines.

The application of Lincoln Welded Bonds would be well worth while if it did no more than cut down your coal needs.

But high voltage is even more important to your transportation department.

The Lincoln

636 Huron Road

Cleveland Closes Factories to Run Streetcar Lines

Lack of Coal Leads City to
Cut Off Electric Power
of 2,000 Plants

125,000 Out of Work

War Contracts Affected and
Federal Aid Is Again
Sought

[Special Correspondence]

CLEVELAND, Dec. 15.—By cutting off the electric power of 2,000 Cleveland industrial concerns to-day, throwing 125,000 workers out of employment, the Cleveland Electric Illuminating Company made it possible for streetcars to run to-night and to-morrow.

Of the hundreds of cars of coal being sent to the company, enough will arrive by Monday morning, company officials confidently expect, to assure streetcar and street lighting service for the city and to permit a number of the industrial plants to resume operations.

While agents of State Fuel Administrator Johnson were trying to-day to hasten coal to Cleveland to keep up streetcar service an effort was being made to relieve suffering in 25,000 homes that lacked fuel.

To make its scanty supply of fuel last as long as possible to keep streetcars in operation, the illuminating company cut off current from practically all users of power. In addition to tying up practically every industry in the city, this action resulted in the curtailment of elevator service in most of the downtown buildings. It also resulted in cutting off much of the lighting current from these buildings.

N.Y.
Tribune
Dec. 16, 1917

AGENTS:

Lewis Roth Co., 1012 Liberty Bldg., Philadelphia, Pa., 519 W. 38th St., New York, N. Y.

Charles N. Wood Co., 14 Federal Street, Boston, Mass.
W. H. Elliott, Chattanooga, Tenn.

Welded Bonds

For Higher Schedule Speed
and
Less Labor for the Cars



Lincoln Welder on Worcester Consolidated Street Ry.

You can see readily enough how low voltage affects car lighting, but it's not so apparent to the eye how low voltage affects schedule speed.

For example, a drop of 50 volts with six stops per mile means a loss of 0.8 miles per hour, or say 6 per cent increase in car hours.

Extra car hours cost a lot more than the Lincoln Welded Bonds that would eliminate them.

Consider the fact that this loss in schedule speed is also an equivalent loss in car capacity and is at its worst during the rush hours, at the very time that you need all the car capacity you can get.

So there can be only one conclusion.

Get the Lincoln Welder
and Lincoln Welded Bonds
and get them quick!

Bonding Company

Cleveland, Ohio

AGENTS:

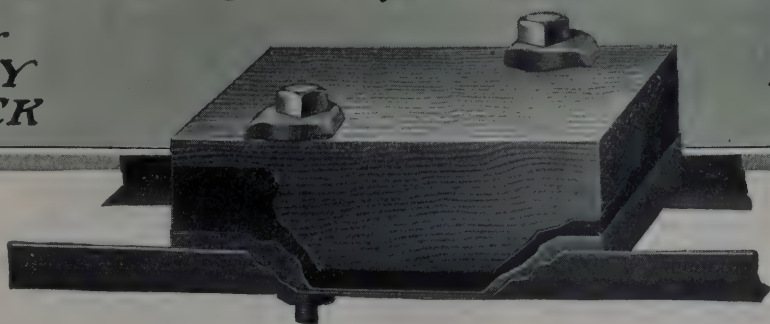
Holden & White, Inc., Fisher Bldg., Chicago, Ill.
W. C. Burdick, First National Bank Bldg.,

The Electrical Engineering & Mfg. Co.,
1st Nat. Bank Bldg., Pittsburgh, Pa.
Milwaukee, Wis.

The MECHANICAL RAILWAY TIE

*For
CITY
TRACK*

*For
INTERURBAN
TRACK*



The Safety Feature of Mechanical Ties Deserves Your Special Consideration

The safety of Mechanical Ties is proven. Of the thousands of these ties in service today, some of which have been installed for over six years, not one has ever failed. Nor is one ever likely to fail. Their principle and construction render failure impossible.

The greatest element of danger in any tie is from its failure to hold the track to gauge. Think of the vigilance exercised by thousands of track walkers, all over the land, to keep spikes driven in and to see that there are not too many rotten ties close enough together to endanger this track gauge. After a wood tie has been subjected to vibration of passing cars for a few years it is only natural that spikes work out frequently.

With the Mechanical Tie the grip on the rails is positive and permanent. In place of spikes, $\frac{3}{4}$ inch bolts are used. These bolts can not pull out or work away from gauge because they pass through and are held by the steel angles. They cannot rust because they are embedded in asphalt and concrete.

Investigation will convince you that Mechanical Railway Ties are the safest. Write for full information.

THE DAYTON MECHANICAL TIE CO.

201 Third Street Arcade
DAYTON, OHIO

Provides the Desirable Qualities of Wood Plus the Strength of Steel, the Permanence of Concrete and the Resiliency of Asphalt—A NonConductor of Vibration



Offered in sizes and combinations to meet various requirements. Operated by steam, gasoline and electricity. Write for circular "E" and list of electric railways now using Thews.

Over 300 Yards per Eight-Hour Day

HARD, unblasted concrete sub-base being removed at the rate of over 300 yards per eight-hour day at the intersection of Mason and Broadway Streets, Milwaukee, Wis.

The shovel is owned by The Arrow Engineering Co., of that city, and has been in continuous service for eight months. We quote them as follows:

"We cannot speak too highly for the results obtained with the Thew, we can readily say there is no other 15 Ton shovel that can do the work this Thew 'is doing.'"

This company owns another Thew which they have had in operation for the past five years, and their expression of results obtained therewith is equally convincing.

Thew Electric Railway Shovels offer the distinct advantages of the other types of Thew shovels. All classes of work required on city and interurban lines is play for the Thew, whether it's deep or shallow cuts, track trenching, grading road beds, tearing up track and ballast, removing old ties and rails, the rugged Thew walks through.

"Thews Are Everywhere"

The Thew Automatic Shovel Company

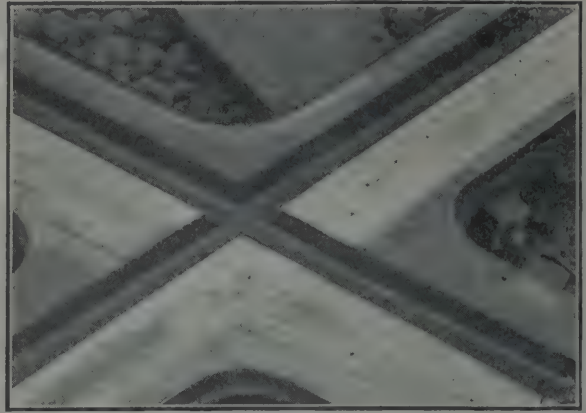
Lorain, Ohio

Sales outside of the United States and Canada handled through the
ALLIED CONSTRUCTION MACHINE CORPORATION, New York, U.S.A.

New York Office:
30 Church Street



What Happens to a Solid Work Crossing



How a Balkwill Crossing Behaves

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of a rolled rail crossing are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill articulated cast-manganese crossing the difficulty is

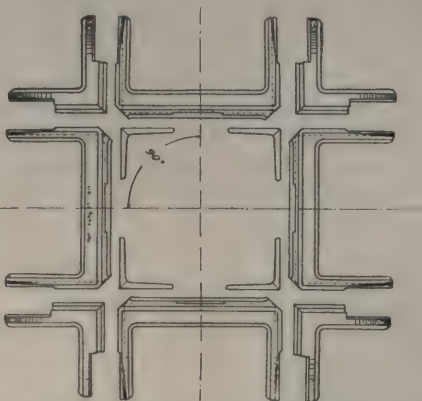
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill crossing. Therefore the Balkwill crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Crossings positively eliminate breakage

**Order Balkwill Crossings
Direct from Your Special Work Manufacturers**

The Balkwill Manganese Crossing Co.

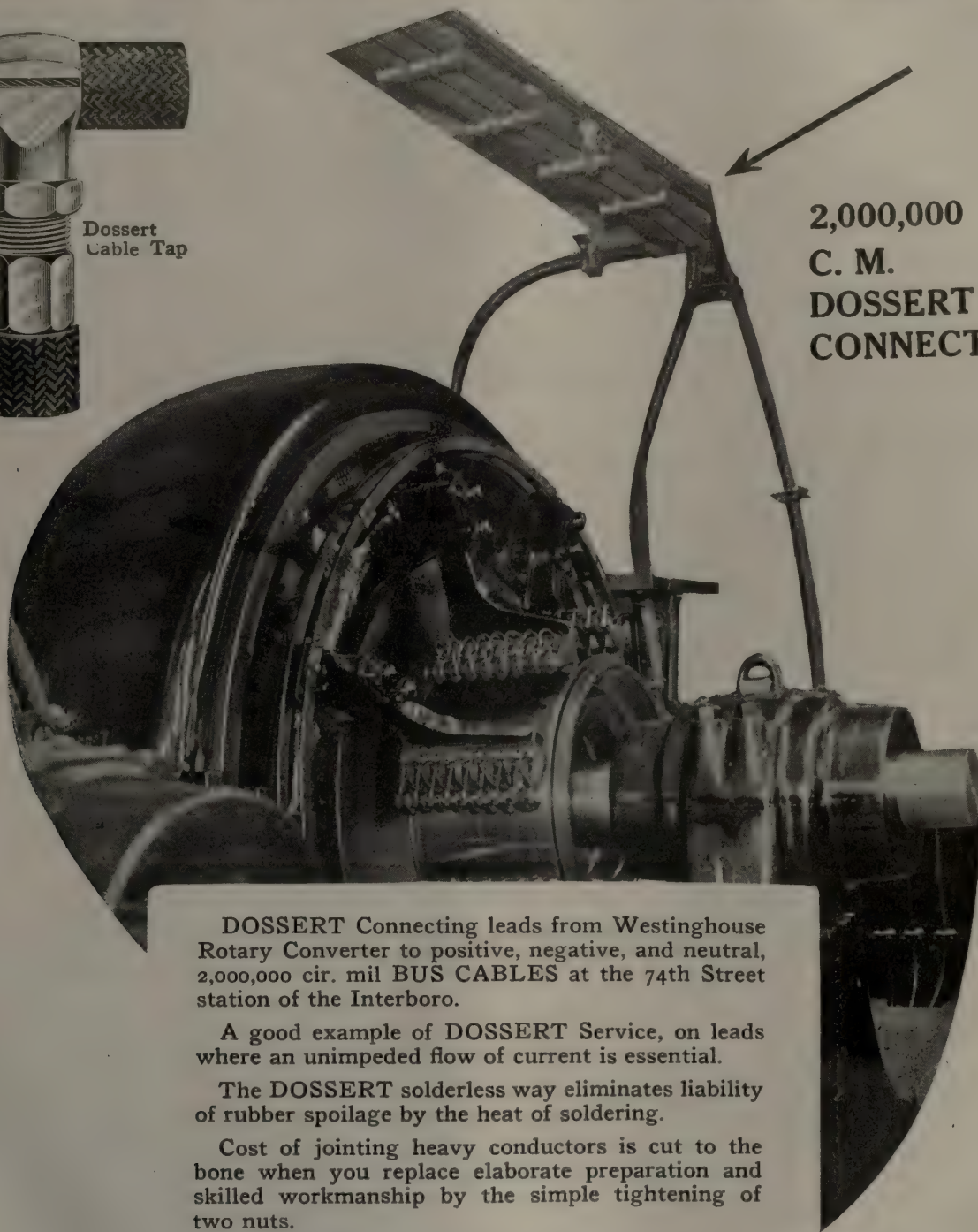
506 Williamson Building, Cleveland, Ohio

Dossert Connectors

at the 74th Street station of the Interboro



Dossert
Cable Tap



2,000,000
C. M.
DOSSERT
CONNECTORS

DOSSERT Connecting leads from Westinghouse Rotary Converter to positive, negative, and neutral, 2,000,000 cir. mil BUS CABLES at the 74th Street station of the Interboro.

A good example of DOSSERT Service, on leads where an unimpeded flow of current is essential.

The DOSSERT solderless way eliminates liability of rubber spoilage by the heat of soldering.

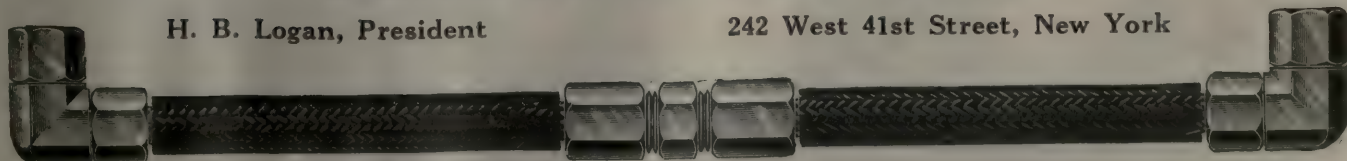
Cost of jointing heavy conductors is cut to the bone when you replace elaborate preparation and skilled workmanship by the simple tightening of two nuts.

Our Catalogue tells the Dossert way.

DOSSERT & COMPANY

H. B. Logan, President

242 West 41st Street, New York



We entered this war to secure a lasting and honorable peace throughout the world.

It may be a long pull, but let it be a strong pull and a pull altogether and we will win. Our resources are unreservedly at the call of the government.

THE CUTTER CO.
PHILADELPHIA

Engineers and Manufacturers of

I-T-E
CIRCUIT BREAKERS

For Better Service in Mechanical Rubber Goods



THE United States Rubber Company, on January 1st, 1918, inaugurates an improved method of marketing in its *Mechanical Goods Division*.

This division includes Rubber Belting, Packing, Fire, Steam, Water, Garden and all other kinds of hose; Rubber Tiling, Mats, Matting, Jar Rings, Toys, Plumbers Supplies; Rubber Tape, Soles, Heels; Fibre Soles and hundreds of other rubber items.

Heretofore these goods have been marketed through subsidiary companies that for years have served all classes of industries, railroads, etc. These subsidiaries include

Revere Rubber Co.

Mechanical Rubber Co., Cleveland

Sawyer Belting Co.

Peerless Rubber Mfg. Co.

Mechanical Rubber Co., Chicago

India Rubber Co.

Eureka Fire Hose Mfg. Co.

This plan will centralize the distribution of all these companies in one organization having branches and agents all over the country. This means quicker and better service everywhere for users of mechanical rubber goods.

The subsidiaries will continue to manufacture the brands such as Holdtite Tape, Rainbow Packing, Four Ace Belting, etc., etc., for which they are famous. The same high standard of quality and workmanship will be maintained. In addition the great seal of the United States Rubber Company, the hall mark of quality and value in rubber goods, will identify these goods.

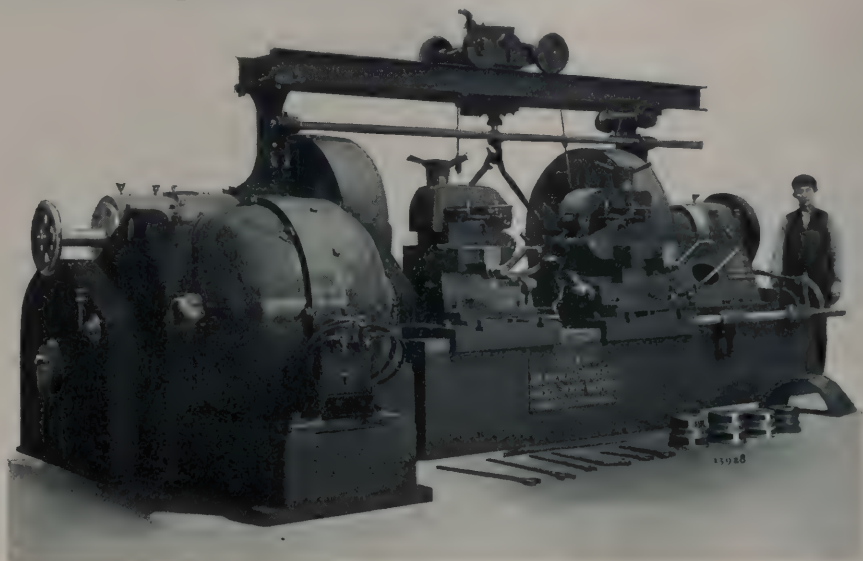
The assembling of all these well known brands in one selling organization makes the most complete line of mechanical rubber goods in the world. With distributors everywhere and factories in the large centers east and west we assure our customers the maximum in service and quality.

United States Rubber Company

MACHINE TOOLS

For Electric Railway Repair Shops

We are in a position to furnish complete machine tool equipment for electric railway repair shops, including steam hammers and electric traveling cranes.



Car Wheel Lathe



Car Wheel Press



Car Wheel Borer

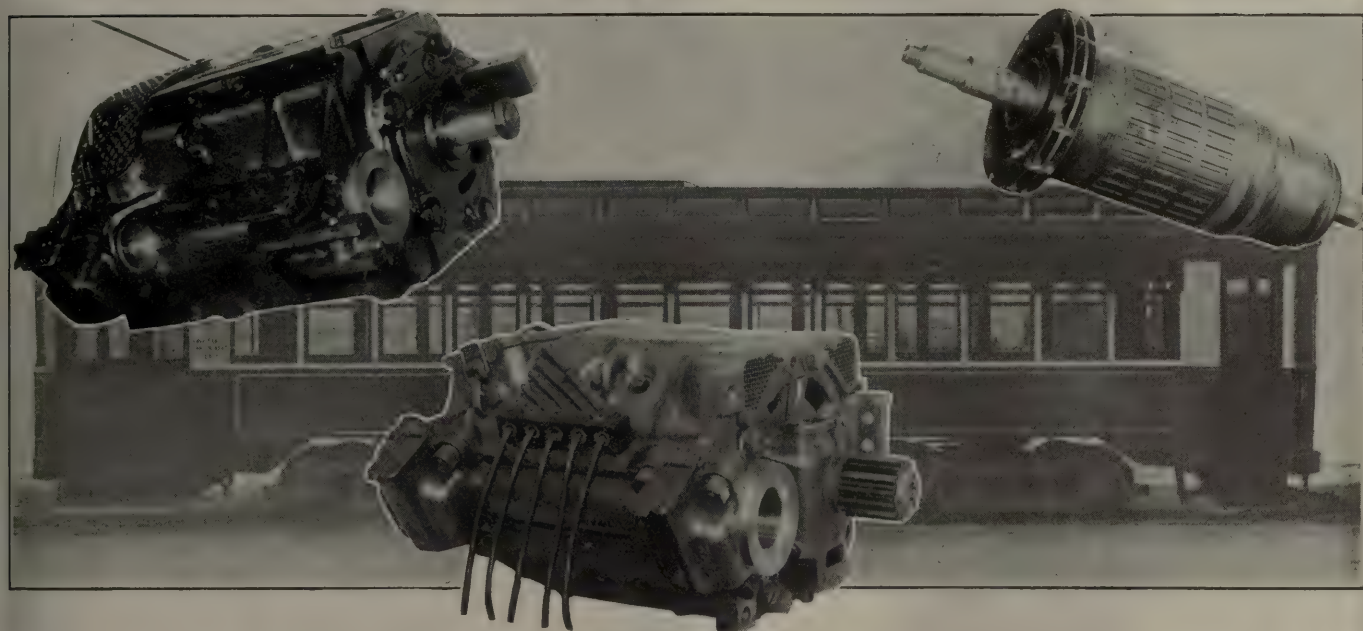
Electric Travelling Cranes - Steam Hammers

NILES-BEMENT-POND CO.

GENERAL OFFICES, 111 BROADWAY, NEW YORK

OFFICES AND AGENCIES—Boston: 93-95 Oliver St. Philadelphia: 405 N. 21st St. Pittsburgh: Frick Bldg. Cleveland, O.: The Niles Tool Works Co., 730 Superior Ave. Hamilton, O.: The Niles Tool Works Co. Cincinnati: The Niles Tool Works Co., 338 W. Fourth St. Detroit: Kerr Bldg. Chicago: 571 W. Washington Blvd. St. Louis: 516 N. Third St. Birmingham, Ala.: 2015 First Ave. San Francisco: 16 to 18 Fremont St. London, Eng.: 25 Victoria St. S. W. For Colorado, Utah, Wyoming and New Mexico: Hendrie & Bolthoff Manufacturing & Supply Co., Denver. For Canada: The John Bertram & Sons Co., Ltd., Dundas, Montreal, Toronto, Winnipeg, Vancouver.

Longer Life



for the Vital Parts of Your Car

Materials of great durability are essential to protect the vital parts of electric cars against any and all destructive influences.

Each type of service requires a specific varnish or compound to meet its specific requirements and no other will serve.

STANDARD INSULATING SPECIALTIES embrace a scientific Standard for EVERY NEED.

Air Drying Voltalac, Elastic Voltalac, Baking Voltalac, Electric Black Finish, Standard Black Finishing and Standard Clear Insulating Varnish.

Impregnite for Railway Field Coils

Manufactured by

STANDARD VARNISH WORKS
 NEW YORK CHICAGO LONDON
 SAN FRANCISCO PARIS BRUSSELS MELBOURNE
 INTERNATIONAL VARNISH CO. Limited TORONTO
 LARGEST IN THE WORLD AND FIRST TO ESTABLISH DEFINITE QUALITY STANDARDS



Sleet Days Are Here!

Delay No Longer—
Get a Full Supply of

Columbia Trolley Wheels

In addition to our standard solid trolley wheels for general service, we direct your attention to the

Columbia Sleet Cutting Wheel

The ideal trolley wheel for insuring uninterrupted collection of current during the prevalence of hail, sleet, snow or ice. Does its work effectively without the aid of auxiliary sleet-cutting devices.

Columbia trolley wheels of both types in diameters of 4-in., 5-in. and 6-in. are in stock ready for immediate shipment. You can meet many other of your wants by ordering from this general list of Columbia products.

Here are some Columbia-made specialties conveniently listed:

TOOLS

Armature and Axle Straighteners
Armature shaft straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car hoists
Car Replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and Axle Bearings
Armature and field coils
Bearings (Axle and Armature)
Brush-holders and brush-holder springs
Brake, door and other Handles
Brake forgings, riggings, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail shoe beams and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.

Holden & White, Inc., Chicago

F. F. Bodler, San Francisco



Atlanta's Arc Headlights
keep a-burning because of
"DELTABESTON"
Magnet
Wire



If users of arc headlights complain that the magnets burn out, ask 'em why they don't get rid of their troubles by using Deltabeston Magnet Wire.

Look at Atlanta! Uses Deltabeston No. 18 Magnet Wire exclusively for its luminous arc headlights because it has found that

**Deltabeston Magnet Wire Does Withstand
 Excessive Heat and Moisture**

Other Delta Products are Delta Tape and Delta Sheeting



D & W FUSE CO.
 PROVIDENCE, R. I.



SPRAY SPECIALTIES

Save Coal In the Plant

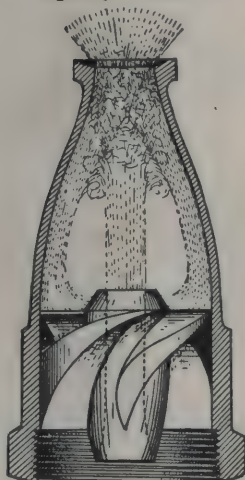
If you will install Spraco power station specialties such as Spray Nozzles, Spray Pond Equipment and Spray Air Washers for steam turbines, you will take an important step in getting

More Value From Every B. T. U.

The Public Service Corporation of New Jersey, the Pennsylvania - Long Island Electrification, the New Orleans Railway and Light Company and the Mahoning and Shenango Railway and Light Company are among many users of Spraco Power Plant Specialties.

The Spraco Air Washer for turbines not only aids higher generating efficiency but also lengthens greatly the periods between shut-downs for clean-ups.

The CENTRAL Spray Does It



Patented SPRACO
Nozzle

Save Labor in the Shop

The Spraco Self-Cleaning Paint Gun multiplies the output of a shopman just as the pneumatic tamper multiplies the output of a trackman. In addition to the saving in man-power, this gun is superior to the brush in

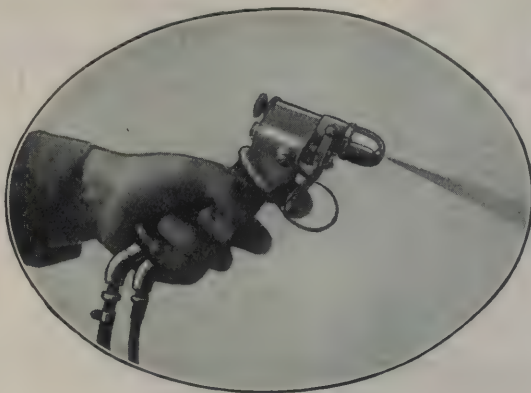
Painting Parts Hard to Reach

One form of the Spraco Self-cleaning Gun weighing only 1 lb., is made for the quick, economical coating of car bodies and parts, including

brake-rigging, fenders, and wheel-guards. As the Spraco Gun is not an atomizer but a **spray**; it can handle any of your present varnishes, paints and lacquers.

A variation of the Spraco Gun known as Model 5 will prove equally advantageous for whitewashing walls and partitions.

Spraco



Products



SPRAY ENGINEERING COMPANY

Engineers for

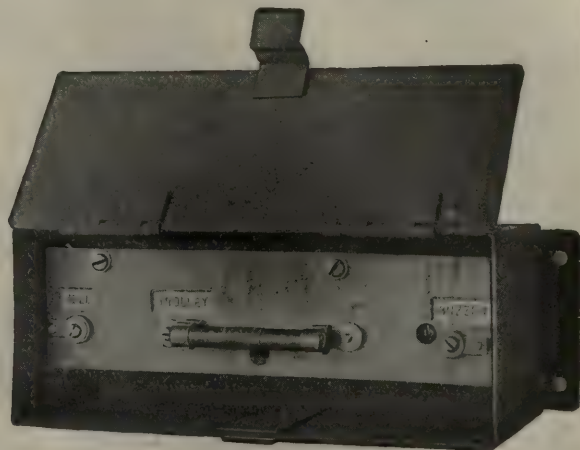
Spray Cooling Ponds, Irrigation Systems, Air Conditioning, Aerating Reservoirs, Odor Condensers, Gas Washing Installations.

93 FEDERAL STREET
BOSTON, MASS.

Manufacturers of

Air Washers for Steam Turbine Generators, Spray Nozzles and Spray Pond Equipments, Paint Spraying Apparatus for Bodies, Trucks and Fenders, Humidifiers, Asphalt Nozzles, Gas Washers, Park Sprinklers, Aerating Nozzles.

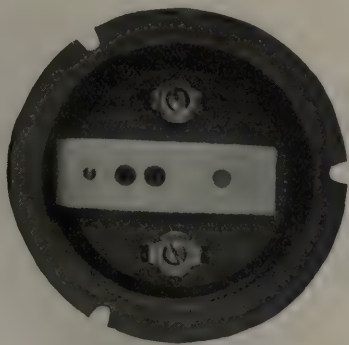
The New Consolidated Buzzer



*—the last word in simplicity and economy
A child can take it apart and put it together again*



No Wearing Parts
Special Resistance
Trifling Current Operates It
Circuit Opened and Closed in
Interrupter—Not in Buzzer
No Sparking at Push Button
Approved by Nat. Board of
Fire Underwriters



The Consolidated way of placing the overhead power supply at the command of the passenger in order to signal a stop is not only more logical than to depend upon a battery, but also far more satisfactory. To you a battery means a continuing expense for replacement and upkeep; while to your passengers it means exasperation when the battery fails to convey their wishes to the motor-man.

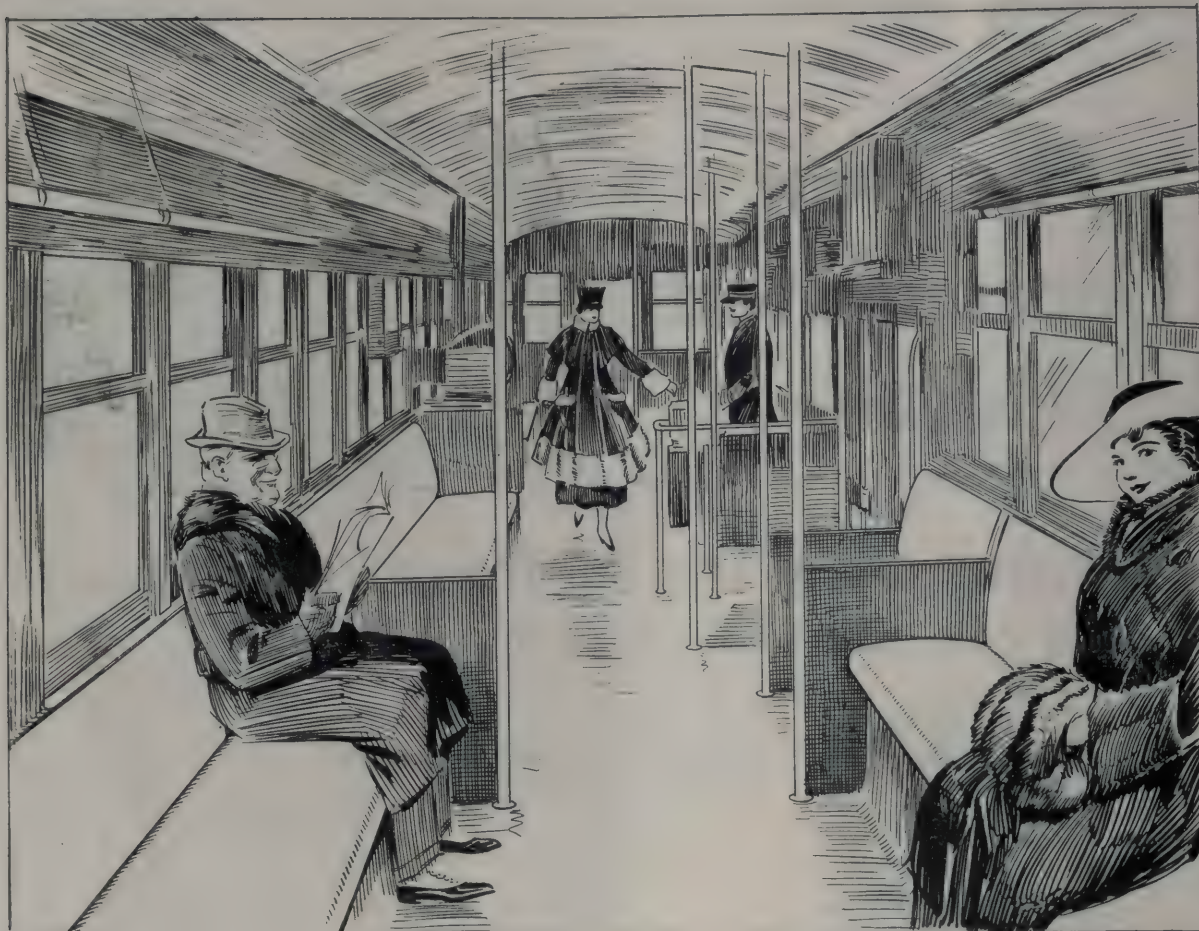
Consolidated Buzzers will give your patrons the pleasant feeling of having their intentions promptly understood and promptly obeyed, while your men will have the satisfaction of avoiding arguments with passengers and of maintaining their schedules with greater ease.

CONSOLIDATED CAR-HEATING CO.

ALBANY

NEW YORK

CHICAGO



No Matter What Type of Car You Are Running

At no time in the history of electric railroading has so much thought been given to making car riding attractive than now.

This attractiveness lies largely in three things: More Service, Greater Schedule Speed and Better Seating.

Better Seating comprehends as a matter of course the design of shapes and use of materials best suited for each class in that wide range of electric railway service which extends from the frequent-stop city car to the palatial interurban. But seen in a broader way, *Better Seating* also includes the

Relation of Seating to Service and Speed

Thus in several Hale and Kilburn types for city use certain features like the set-in back construction mean a respectable increase in the car capacity or *service* offered.

Our specialized experience in seating layouts enables us to co-operate effectively with you to make the seating help instead of hinder the

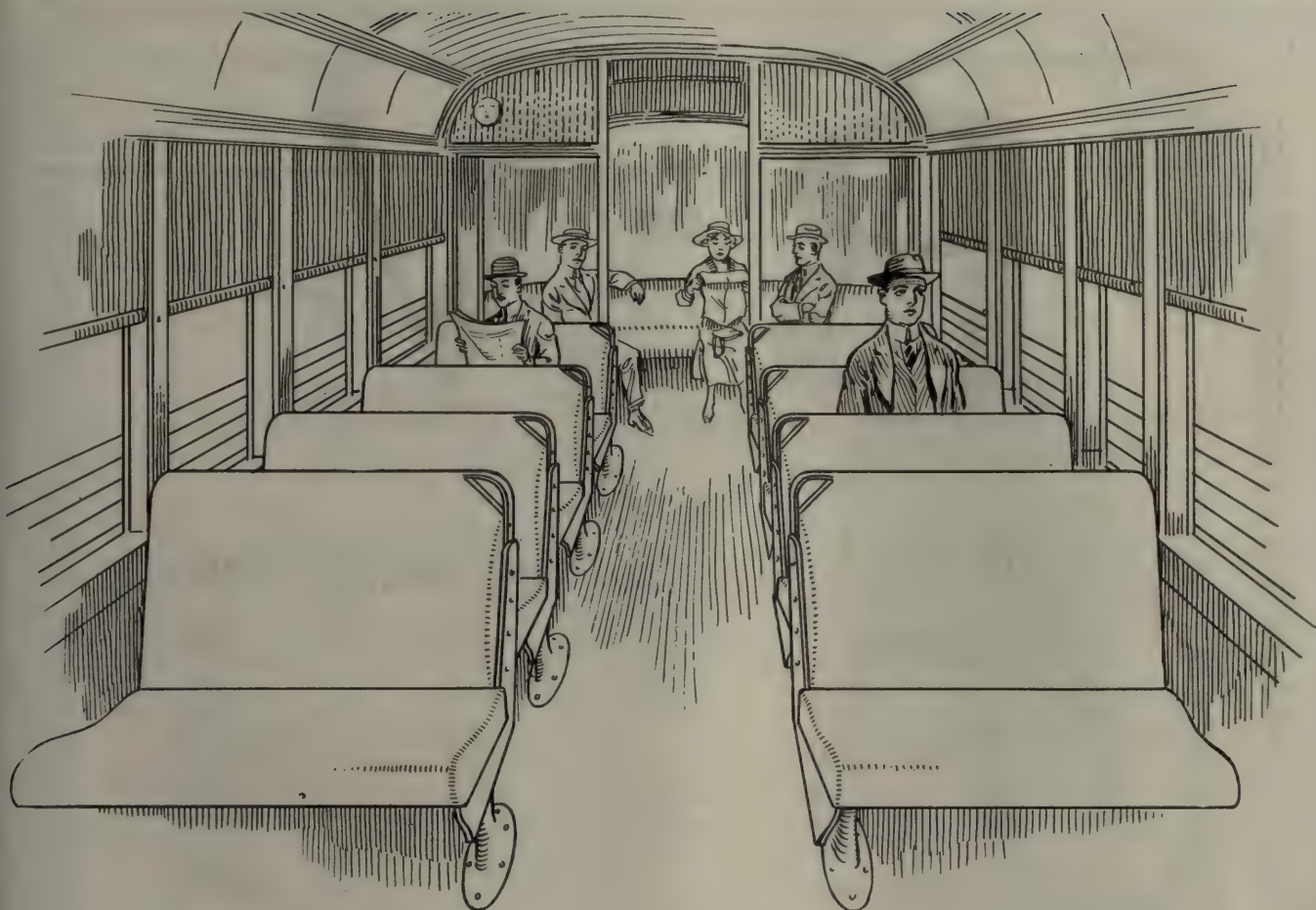
Quickest Rate of Passenger Interchange



Hale and

Philadelphia
Washington

New York
Atlanta



Hale and Kilburn Seats Will Build Business for You

Hale and Kilburn alertness to the tendencies of the times is proved by examining the types of seats already in use on modern one-man safety and pay-as-you-pass cars.

For the one-man type, there is, for example, the No. 108, in which simplicity, durability and convenience seemingly can go no further.

The No. 108 has only four parts: The steel aisle wall

end support, the hardwood framed rattan cushion and the hardwood framed rattan back.

The waste of carrying needless dead weight in iron castings is eliminated, for the No. 108 weighs but one-half of designs made without our special steel-pressing machinery.

Also on many Peter Witt Pay-As-You-Pass Cars

Hale and Kilburn seating service is helping to make these cars the fastest ever designed for the rapid handling of passengers.

Both the all-longitudinal seat cars and those with transverse and circular seats in the rear are made to give

Comfortable Riding for High-Acceleration,
High Braking Service

Kilburn Co.

Chicago
San Francisco

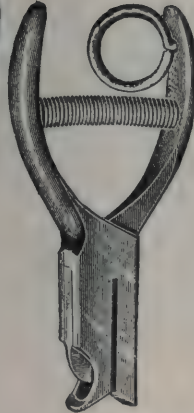
Detroit
Louisville





B-V

Ticket



Punches

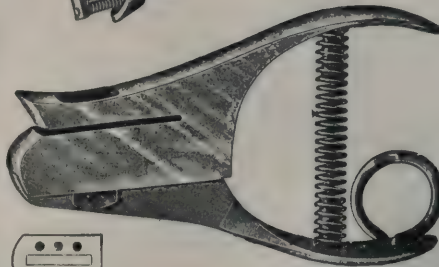
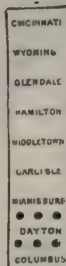
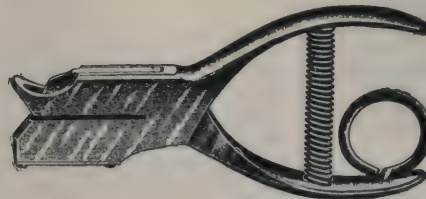
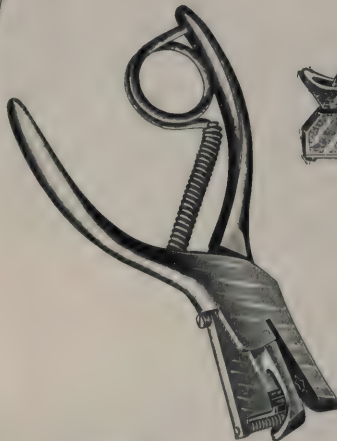


Have been adopted as Standard on the leading electric railways and steam roads in the United States and foreign countries.

Send for Catalog.

BONNEY-VEHSLAGE TOOL CO.

61 New Jersey R.R. Ave.
Newark, N. J.



A car without a
**JOHNSON
FARE BOX**
is like a store
without a cash
register



There's hardly a store, even in the smallest town, that hasn't an up-to-the-times cash register.

If it pays a storekeeper to keep tabs on himself, how much more will it pay you to keep a check on others who are handling your money?

While there are more than 10,000 Johnson fare boxes in use today, yet there are still thousands of cars in this country that are without this recognized embodiment of fare collection apparatus which

Gets and keeps the money for the railway company.

Won't you let us help you get all the money you are entitled to receive?

JOHNSON FARE BOX COMPANY

Jackson Boulevard and Robey St., Chicago

50 East 42nd Street, New York

An Acre of Diamonds



Have you ever heard Russell Conwell's famous lecture entitled, "Acres of Diamonds"? He shows that the world is full of opportunities for the man who hunts them. Riches are to be found sometimes in the most unexpected places.

Coal deposits excited no interest in the minds of our grandfathers until somebody discovered the possibilities of coal. Electricity was useless to man until he finally recognized its existence and harnessed it up to do his work. It then became a tremendous force in the advancement of civilization.

You have a tremendous force for the advancement of your business in the "human nature" part of the men you employ. Your conductors are potential business getters. They are potential income protectors. They are potential advertisers of your business. If you depend upon your publicity agent only for the boosting of your business; if you depend for the protection of your fares on spotters and fare receptacles only and ignore the peculiar possibilities of the human factor in this connection, you, as a railroad man, are missing your "acre of diamonds."

The Ohmer System

Economy is the order of the day. Economy does not mean spending less money, but it means getting greater value for what you spend. If you have increased the wages of your employes and are not receiving from them greater efficiency, greater loyalty, and a higher standard of service, there is something wrong.

We have assisted materially in bringing success to the electric railway business by solving the problem of the "human factor" as it relates to the conductor and his work, and the electric railway companies which are now maintaining success under adverse conditions are, almost without exception, our clients. They are "Ohmer System Companies."

Let us analyze your local conditions and apply the results of our experience to your needs. It will cost you nothing to get our ideas.

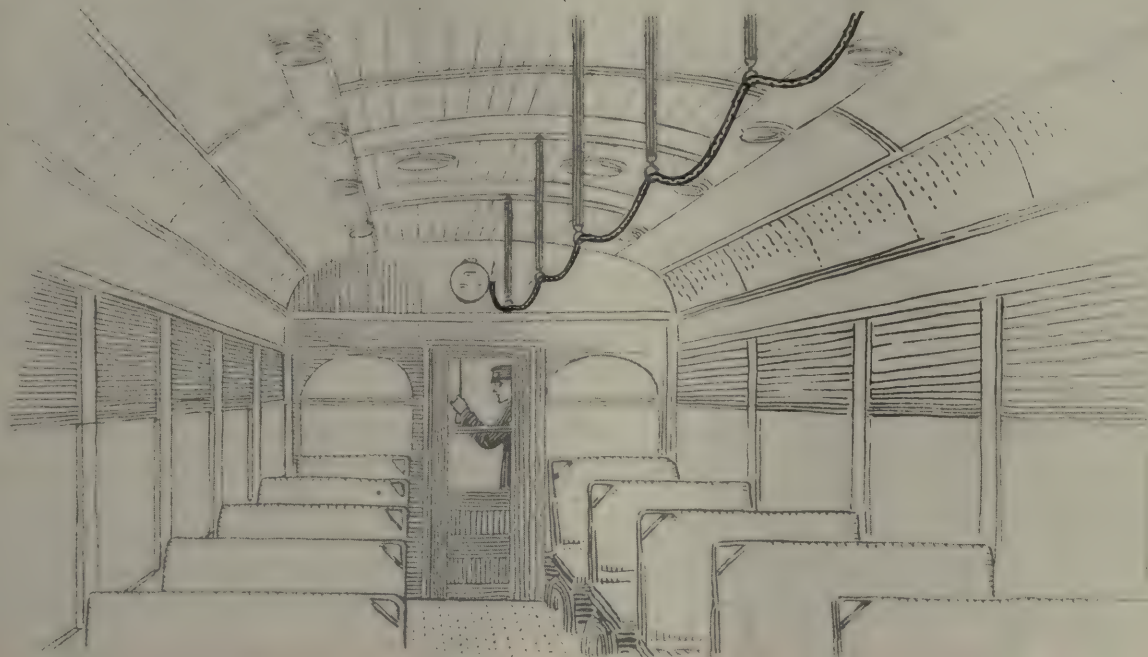


An Ohmer operating equipment adapted to either pay-within, pay-as-you-enter, one-man, or two-man operation

Ohmer Fare Register Company
Dayton, Ohio



For **STRENGTH** and **DURABILITY**



Samson Solid Braided Cotton Bell and Register Cord

should be on every car operated by a company which believes in the conservation of materials and in true economy of maintenance.

The experience of the largest roads in the country shows that Samson Cord is more durable at less cost than other materials, and is far more economical than common, roughly braided cord.

Samson Bell and Register Cord is the same extra quality as Samson Spot Trolley Cord.

Carried in stock in Mahogany, Drab and White. Special colors made to order. Samples and full information are yours for the asking.

Samson Cordage Works, Boston, Mass.

**Useless Weight Means Waste
of Coal and Money.**

This is True of Conduit Weights, Too!

If every electric railway car in the United States was as light in weight per passenger as the

BIRNEY-STONE & WEBSTER SAFETY CAR

There would be a handsome reduction in the yearly total of 14,000,000 tons of coal for which the electric railways of this country are responsible.

One of the reasons why the Stone & Webster Safety Car is so efficient in weight is that it is conduited throughout with

DURADUCT

A durable, flexible conduit which is not only most economical in cost, but which saves hundreds of pounds per car as its weight averages only one-ninth that of metal piping.

And the labor item for installation is a lot less, too. Duraduct needs no bending tools nor a husky helper to assist the wireman!

There's no better time than now to let Duraduct help you protect your wiring at least first and continuing cost.

TUBULAR WOVEN FABRIC COMPANY
MANUFACTURERS — PAWTUCKET, R. I.
GENERAL SALES AGENT — A HALL BERRY

71-73 Murray St., New York

9 So. Clinton St., Chicago

Northern Electric Company Distributors for Canada
LIMITED

THE BLACK DOTTED LINE
IS THE MARK OF
DURADUCT



EVERYTHING THAT YOU NEED—IF IT'S ELECTRICAL—IN ONE BOOK—THE *Western Electric* YEAR BOOK

Keep it within reach when you are making up your estimates and requisitions for new construction and maintenance work.

The one uniform set of list prices—the one basic discount—makes for ease in preparing estimates.

One source, too, for all your supplies means the one uniform, high standard that is characteristic of the line of Western Electric Quality Products.

Consult our Year Book—then our nearest house.

SAVE TIME AND FREIGHT

Western Electric Company
INCORPORATED

New York	Atlanta	Chicago	St. Louis	San Francisco
Buffalo	Savannah	Cleveland	Cincinnati	Oakland
Newark	Birmingham	Indianapolis	Kansas City	Los Angeles
Elkhart	New Orleans	Detroit	Omaha	Seattle
New Haven	Charlotte	Milwaukee	Oklahoma City	Portland
Philadelphia	Baltimore	Minneapolis	Dallas	Salt Lake City
Pittsburgh	Richmond	St. Paul	Houston	Denver

EQUIPMENT FOR EVERY ELECTRICAL NEED

MEMBER OF

Like a Flash—



Touch this
gate—

Down goes
this guard

Front End Accidents Are Made Impossible

Touch the gate in front and down comes the guard, picking up the person before the wheels can reach the body.

And Providence Fenders, too, are built on the principle of "instant action." Let us send you more information on this subject.

The Consolidated Car Fender Co.

Providence, R. I.

General Sales Agent

Wendell & MacDuffie Co.

61 Broadway, N. Y.

How a big man played an up-hill game and WON!

When E. M. Paget took charge of the Sales Department of the Iliff-Bruff Chemical Company, Chicago, the problem was to market the product of a new concern in an already crowded field and at a time of great business depression.

It was freely predicted that he would fail within six months. But this man's back was to the wall. It was strictly up to him. He had to make good—How?

The determination to win was there all right. But Mr. Paget realized that he had to have a broader business training to carry his determination thru.

An enrolment for the Modern Business Course and Service of the Alexander Hamilton Institute was the answer to this question.

So Mr. Paget enrolled.

With the unfolding of this vast fund of business knowledge, he applied the first principles he thus acquired to his own business needs.

Slowly but surely one and all of the obstacles were overcome.

His knowledge was sound

And. Mr. Paget now says—"I look back at the lean months we had experienced, and when I contrast the wonderful business we are now doing, I know it is not enough to simply have a superior product, a well-managed factory and a loyal organization fired with push and energy.

"One *must* understand the great business fundamentals. He must know how and why certain methods have led to success, while others, many of which we are prone to almost unconsciously adopt, spell only failure."

He says further: "If the total cost of the Sales Department in any other line were figured against the total cost of my department, it would probably be found that we are operating at a

smaller percentage of expense than the average sales department.

"This is due to methods, a great part of which was gathered from your Course."

What results training brings

Here was one Sales Manager—one of thousands—who won out by absorbing basic facts—by getting down to the bare fundamentals of business and fitting them to the job he had to do.

And, the answer? When Mr. Paget took charge of the Sales Department, his salary was \$3,600 per year. His earnings have now reached a point attained by few Sales Managers.

This man only one of many

The same business information which this man applied so successfully to his business is available, too, to you. If you own a business—if you are an executive—if you hope to be an executive—you need this Course.

The Alexander Hamilton Institute gives you the best thought and experience of thousands of successful business men—brings it to you in the most practical, most interesting, easily readable form for absorption in your leisure time.

In the final analysis you and every other man in business are selling one thing—service.

Every source that can be drawn on for the improvement of self—for the betterment of that product—is worthy of the little time, the little effort, you are obliged to give.

This same material which has helped hundreds of other men to success will be yours to use as a guide to certain business growth.

The kind of men enrolled

Presidents of big corporations are often enrolled for the Modern Business Course and Service



along with ambitious young men in their employ.

Among the 65,000 subscribers are such men as A. T. Hardin, Vice-President of the New York Central Lines; E. R. Behrend, President of the Hamermill Paper Co.; N. A. Hawkins, Manager of Sales, Ford Motor Co.; William C. D'Arcy, President of the Associated Advertising Clubs of the World; Melville W. Mix, President of the Dodge Manufacturing Co., and scores of others equally prominent.

In the Standard Oil Company 291 men are enrolled in the Alexander Hamilton Institute; in the United States Steel Corporation, 450; in the National Cash Register Company, 194; in the Pennsylvania Railroad Company, 108; in the General Electric Company, 300—and so on down the list of the biggest concerns in America.

Advisory Council

Business and educational authority of the highest standing is represented in the Advisory Council of the Institute.

This Council includes Frank A. Vanderbilt, President of the National City Bank of New York; Judge E. H. Gary, head of the United States Steel Corporation; John Hays Hammond, the eminent engineer; Jeremiah W. Jenks, the statistician and economist, and Joseph French Johnson, Dean of the New York University School of Commerce.

"Forging Ahead In Business"

A careful reading of the interesting 112-page book, "Forging Ahead in Business," which we will send you free, will show you how to prepare for the increasing number of business opportunities that are bound to come during the next few years.

Every man and woman with either a business or a career to guide to bigger, surer success, should read this book. Simply fill out and send the coupon below.

Alexander Hamilton Institute

232 Astor Place, New York City

Send me "FORGING AHEAD
IN BUSINESS"—Free

Name Print Here

Business Address

Business Position



International Fare

On One

Make 100 Per Cent Fare Co

Two of the most pressing things that electric railways must do today is to

Increase the **income** by getting more fares and getting full collection of fares; and

Lower the **outgo** by cutting platform expense without cutting individual wages—which means the handling of more passengers per operator either with one-man cars or trains.

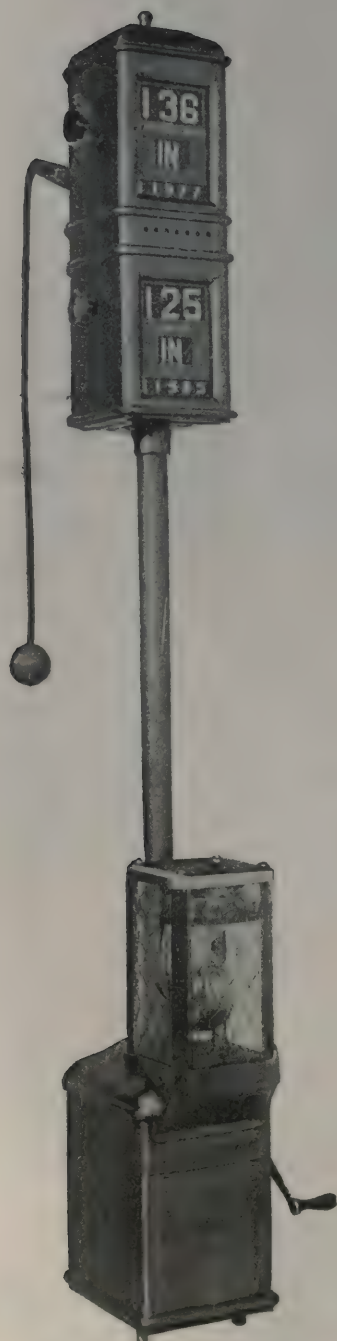
With the coming of odd fares and zone fares it will be harder than ever for the conductor to

Keep the Car Moving at High Schedule Speed

And yet give proper attention to fare collection, unless he is provided with every available mechanical aid to reduce labor.

For straight 5-cent fares on one-man double-end cars you may like best the International C16 Fare Box if the service is light and a separate register is available for use in connection with the box.

On single-end cars where frequent removal of coin registers from end to end of the car is not required the International C15 Coin Register is preferable, because the operator does not have to work two different machines or worry about consequent discrepancies between Box and Register readings. The C15 furnishes in one machine both visible and audible registration.



Type C21 Combination
Coin and Transfer
Register



Type
C15
Coin
Register

The International Register Company

Collection Devices

Man Cars

Collection a Physical Possibility

For One-Man Cars on Short Headways

The International C26 Coin Register with motor drive, which greatly lightens the duties of the conductor, is still better, as then only will it be possible to combine the collection of all fares with little or no loss of schedule speed. The motor-driven type avoids loss of car hours just as well as it avoids loss of fares.



Type C16 Fare Box



Cash Side Type C17
Coin and Metal
Ticket Fare Box

For One-Man Cars with Mixed Fares

Such as cash and transfers, or cash and tickets, the International C21, hand-operated, will fill the bill for light service, and the C26, motor-operated, for heavy service.

For one-man cars using cash and metal ticket fares, the International Type C17 Fare Box, or the International Type C14 Metal Ticket and Coin Register is available, either hand or motor-operated, and if transfers are used, the Type C20 International Coin, Metal Ticket and Transfer Register.

Finally, on light runs where a small percentage of paper tickets are received, a combination of counting Fare Box and non-counting ticket receptacle is in use on one-man prepayment and postpayment cars.

The motor-driven machines are especially advantageous on single-end cars (or double-end cars operated over loop terminals), as such cars make unnecessary the duplication of the motor part or the carrying of the equipment by hand when changing ends.



Type C14 Coin and
Metal Ticket Register

15 South Throop Street, Chicago, Ill.

International Fare Collection

On Two-Man Cars

Make 100 Per Cent Fare Collection

On the electric railway of the early future we may expect to see new two-men cars only on lines which are extremely busy in themselves or which operate in large part over congested routes. Further, wherever possible, such busy lines will be operated in connection with

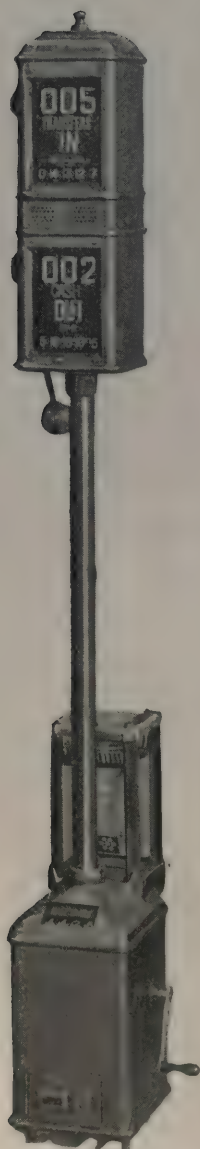
Prepayment Stations and Motor-Driven Registers

Because practically perfect fare collection, and enormous saving in time and reduction in track congestion are thus assured, as proved by the Boston Elevated Railway's success with International motor-driven station registers.

It was also Boston that proved that where the fares must be collected on cars of heavy traffic the only satisfactory way to do so is to use International motor-driven coin registers because

Motor-Driven Registers on the Car Give Maximum Revenue Collection and Maximum Mileage Revenue

Hitherto International motor-driven registers have been available only in the Boston C 25 and 26 coin and transfer types and the cash and metal ticket types named in connection with one-man cars. Now we are prepared to announce the early installation of an entirely new type, the C 29.



Type C20 Coin,
Metal Ticket and
Transfer Register



Motor-
Driven
Type C25
Coin
and Transfer
Register

The International Register Company, 15 So

ection Devices

or Trains

a Physical Possibility

Three Hundred International Motor-Driven Registers to Handle Cash, Paper Tickets and Transfers

Toledo Railways & Light Company

In this International machine specially designed to meet the most exacting demands of efficient fare collection on short headways:

The same hopper receives both cash and paper tickets—hesitation and mistakes by passengers are therefore eliminated.

The cash is counted on the totalizer and registered on the register **automatically** whereupon it is available to the conductor for change.

The tickets are mechanically separated from the coins in a motor-driven drum. An endless belt prevents choking or stoppage no matter how rapidly the tickets are deposited. Tickets are registered by operating a pedal. After mutilation they enter a locked compartment.

The ticket compartment is protected with both a cylinder lock and a glass signature seal. A separate box in this compartment receives any quarters and half dollars that may be deposited by mistake; also all pennies deposited.

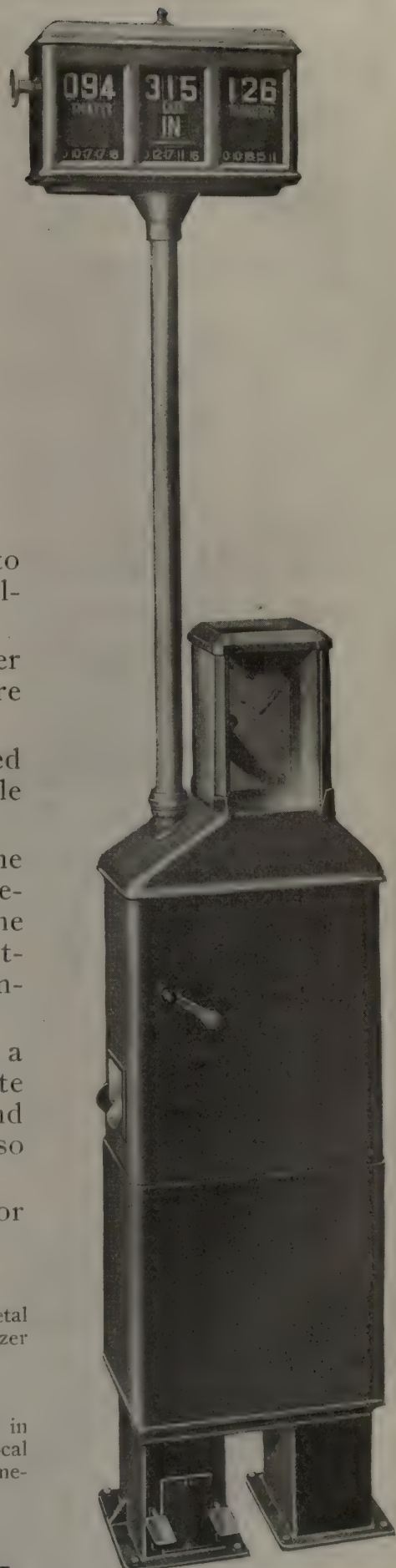
The transfers are collected directly by the conductor and registered by means of a separate pedal.

Metal Tickets May Also Be Motor-Counted

In this machine by making certain changes whereby all cash and metal ticket fares would be shown on the cash register but a separate totalizer would permit classification.

From One-Man Car to City Trains

Comprehends a wide range of service, but for practically every step in that range there is an International device which meets exactly your local combination of fare and traffic factors. If not, we are ready to make something that will.



C29 Motor-Driven Coin, Paper
Ticket and Transfer Register

th Throop Street, Chicago, Ill.

See how
easy it is
to check the
war tax
with the

Bonham Traffic Recorder

No special war tax checks.
No extra work for conductors.
Less than one minute required by checker to enter and add war tax.
This is only one of the many reasons why you should have Bonham Traffic Recorder Service.

The Bonham
Recorder
Company
Hamilton, Ohio

Month	Day	Train	Div.	Total Cash	Psgs.	Total Psgs.
12	07	53	3	19557	44398	
		On	Off	Miles	Cash	
			45	22	4	44
			45	22	4	44
			45	22		
			61	30		
			71	35		
			71	35	6	70
			71	35	6	70
			21	10		20
			9	4		8
			27	13		26
			27	13		26
			45	22	4	44
			45	22	4	44
	9		61	26	4	52
	9		61	26		
	9		61	26		
	9		71	31		
	9		71	31		
	9		33	12		24
	21		61	20	3	40
	21		61	20	3	40
	21		45	12		
	21		45	12		24
	21		71	25		
	21		71	25		
	21		71	25	12	50
	21		33	6		12
	21		33	6		12
	27		45	9		
	27		45	9		18
	33		71	19	3	38
	33		61	14	45	28
	33		61	14		
	33		61	14		
	33		45	6		12
	33		45	6		
	33		45	6		
12	07	53	3	19579	44435	
		L. S. Harris		22		37
		Miles	685			
		Cash		7.46		
		WarTax		.45		
		Total Charge to Conductor		\$7.91		
		Tickets		6.24		
		Total Revenue		\$13.70		



Every Kilowatt-Hour of
Electrical Energy You
Save Means

4 LBS. OF COAL SAVED!

That means not only FUEL CONSER-
VATION, but

\$63.00 SAVED

**ON EVERY STANDARD CITY
CAR PER HEATING SEASON**

if the electric heaters are regulated by
means of UTILITY Thermometer Con-
trol.

And the saving on smaller cars will be
in proportion.

WRITE FOR DETAILS

Railway Utility Company

151 West 22nd Street

CHICAGO, ILLINOIS

Eureka

Commutators and Controller Parts

are guaranteed interchangeable with standard design. Commutator segments and controller fingers are made of hard-drawn or drop forged copper. Best grade of Canadian amber mica is used for all commutator insulation. Finger springs are made from our special alloy phosphor bronze. Special parts made to order. All standard parts shipped from stock.

Trolley Wheels

are made from tough, durable bronze—no scrap used. Machined on specially-designed machinery that makes possible a “just right” job. The accurate balance of Eureka wheels insures true running wheel and gives greater mileage with a minimum amount of wear on wire.

Line Material

is made from uniformly tough and durable metal mixed in our own plant. In order to obtain a tight and smooth clinch, Eureka ears for round wire are cast solid. The grooves are milled centrally with practically no variation in thickness of clinching walls. This makes soldering unnecessary when Eureka ears are used. If so ordered, Eureka ears are furnished tinned. All Eureka standard ears for round and figure 8 wire carried in stock for immediate delivery.

Bulletins on Eureka Controller Parts, Commutators, Brushholders, Trolley Wheels and Line Material Gladly Sent on Request.

Any or all are yours for the asking.

THE EUREKA COMPANY

North East, Pennsylvania



Interior view of one of 26 new cars just put into service by the South Covington & Cincinnati Street Railway. Note the smooth, neat surface of the headlining.

Nevasplit Headlinings

"Nevasplit" is, first of all, a wood fibre.

It won't warp or shrink, it has no grain, so will not split or "check." Its smooth, even surface takes paint readily.

"Nevasplit" is waterproof and of minimum conductivity. It is absolutely uniform in texture. "Nevasplit" is NOT veneered lumber but wood fibre in the highest form of refinement, possessing constructional features and beauty of appearance that make its use an essential for headlining, insulation roofs and interlining of cars.

To specify "Nevasplit" means a positive saving of money.

Let us send samples of "Nevasplit" so you can see with your own eyes the advantages of this material for YOUR cars.

The Keyes Products Company

120 Broadway, New York

NEW YORK

W. R. Kerschner Co., Inc.,
50 Church St.

CHICAGO

J. E. Simons
Fisher Bldg.

SAN FRANCISCO

Ford & Geirrine
Merchants' Exchange Bldg.

ITALY

American Traffic Co.
Via Capuccini, No. 4, Milano, Italy

ARE YOU GETTING FULL

Trade-Mark

BOUND BROOK

Reg. U. S. Pat. Office

OIL-LESS BEARINGS

?

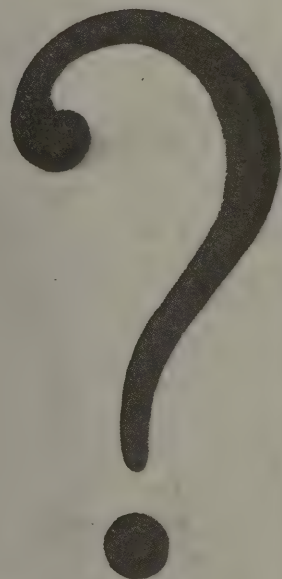
Here is a table of the wheel and bushing mileages obtained by various users of Bound Brook Bushings, which shows a most astonishing range of life despite the fact that Bound Brook Graphited Oil-less Bushings are absolutely uniform and are noted for the consistent individual mileage they give for any one combination of service characteristics.

	Wheel Dia.; Inches	Wheel Miles	Bushing Miles	Tension Pounds	Amperes Carried	Compositio n, per Cent
Railway No. 1--City	4	8,600	8,600	25	200-250	89 Cu; 10 Tin; 1 Anti.
Sub.	6	8,600	8,600	30	400-500	89 Cu; 10 Tin; 1 Anti.
Railway No. 2.	6	29,000	10,900	22	200-400	Special
Railway No. 3.	....	9,000	98% outlast the wheel	20	500	88 Cu; 10 Tin; 2 Zn.
Railway No. 4.	5	15,000	15,000 or more with better inspection	22-25	400	Special
Railway No. 5.	4½	6,500	Equal with better inspection	20-24	300	Special
Railway No. 6.	4	27,633	27,633	25	.....	Special



Bound Brook Oil-less Bear

MILEAGE OUT OF YOUR GRAPHITED FOR TROLLEY WHEELS



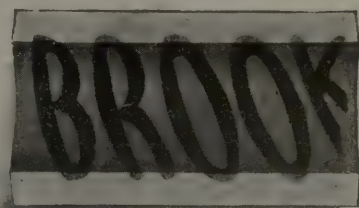
All of the railways in this table operate at practically the same speeds except where suburban service is noted. Yet observe that

Bushing life ranges from a minimum of 8,600 to a maximum of 27,633 miles or more; and it would seem from the other factors noted that peripheral speeds, currents and tensions are not determining factors.

It seems significant, however, that those railways which are using short-life composition trolley wheels also get a short life for the bushing; while those using long-life wheels find the bushing perfectly capable of lasting as long as the wheels.

Isn't part of the answer to be found in the application of better maintenance of line and of current-carrying equipment on the car? We should be glad to have similar records from you because—

We don't want Bound Brook Oil-less Bearing service to stop with our delivery of the product to you. We want to know just what results you are getting and under what conditions of operation, so that we can help you to get more miles per bushing on your property and perchance improve the bushing for all properties.



g Co., Bound Brook, N. J.

V-K



OILLESS TROLLEY WHEEL AND NON-ARCING HARP

1917 has been a year of unprecedented strain.

1918 will find every difficulty intensified and new ones heaped upon you.

Are you prepared to meet them?

V-K Trolley Equipment will help mightily. It saves current—saves labor—saves renewal expense—saves overhead.

There's no time to lose. Ask us how and why.

Write today for catalog and full particulars.

More-Jones Brass & Metal Company

3134 No. Broadway, St. Louis, U. S. A.

Facts Are Stubborn Things

They refuse to be shoved into the background.

The *fact* that users of gasoline motor trucks are paying nearly 30 cents a gallon for fuel—

The *fact* that to this expense must be added the cost of lubricating oil—

The *fact* that with electrically driven vehicles the cost for propulsive force is nearly nothing because the batteries can be charged at night during low-load periods—

The *fact* that two dollars' worth of grease (no oil) lubricates a G.V. Electric Truck for a year—

These *facts* cannot be discounted. They prove conclusively the economies that can be effected by using G.V. Electric Trucks.

Other reasons—*facts*—why G.V. Electric Trucks should be used, are:

Tires last 25% longer; long life; minimum labor and repair costs; ample mileage per charge; nothing to freeze in cold weather.

Send for catalog J-82 showing our 6 models.

G. V. Electric used by Holyoke Street Railway Company

General Vehicle Company, Inc.

General Office and Factory:

Long Island City, New York



Make the World
SAFE for
Democracy

SWAT

Every
Liberty Bond
You Buy Helps
Win the War.

**MILITARY
AUTOCRACY**

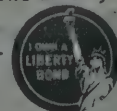
BUY MORE
LIBERTY BONDS




Owners of
LIBERTY LOAN BONDS

of the Second Liberty Loan of 1917


Wear
this-



BADGE OF HONOR

Before Sunset
TO-DAY


BUY A
LIBERTY BOND



Every **LIBERTY BOND**
is a shot
at a **U BOAT**

**FIRE YOUR SHOT
TO-DAY**

BUY A
LIBERTY BOND



"SHALL WE BE MORE
TENDER WITH OUR
DOLLARS THAN WITH
THE LIVES OF OUR
SONS?"

mylender
COLLECTOR OF THE LIBRARY

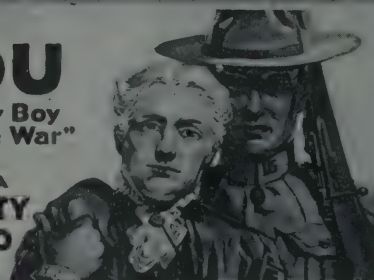
BUY A
LIBERTY BOND

WE DEPEND
ON YOU



"YOU
Help My Boy
Win the War"

BUY A
LIBERTY BOND



The United States Government desired immediate nation-wide publicity in electric cars. The existence of **COLLIER SERVICE** made it possible to meet perfectly this great need of the Government.

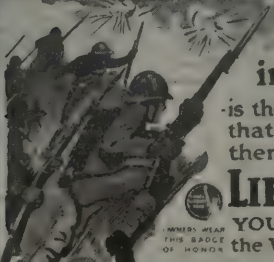
Barron J. Collier
INCORPORATED

Our Boys
in the Trenches

is there anything they need
that you would not give
them? Every

LIBERTY BOND

YOU buy helps them WIN
the War. Buy more Liberty Bonds!



Make a Sacrifice

Every man who should
a gun risks his all for
his country. What are YOU
sacrificing to back him up?

Every
LIBERTY BOND
you buy helps win the War!

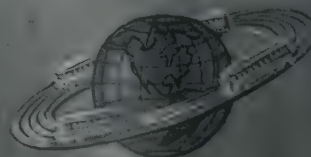


**STRIKE
TWO!**



HELP
**STRIKE OUT
MILITARY
AUTOCRACY!**

Every **LIBERTY BOND**
You buy
Helps Win the War



Generous, Substantial Support

is what we enjoy at the hands of the progressive manufacturers of car or maintenance equipment, for whom we are exclusive Eastern agents.

The high standard of their products is a good, solid foundation for the uniform satisfaction of our customers.

We solicit correspondence relative to the products of any of these firms and will be pleased to answer questions relative thereto. Literature on request.

THE COLUMBIA MACHINE WORKS & MALLEABLE IRON CO.

Brooklyn, New York

Railway Supplies, Shop Machinery and Estimates on Steamship Supplies

THE CINCINNATI CAR COMPANY

Cincinnati, Ohio

Electric Traction Cars

THE CATSKILL FOUNDRY & MACHINE WORKS

Catskill, New York

High Grade Gears and Pinions

THE KEYES PRODUCTS COMPANY

New York, N. Y.

Nevasplit Car Headlining and Panels

C. I. EARLL

New York, N. Y.

Trolley Catchers and Retrievers

THE ALBANY CAR WHEEL COMPANY

Albany, New York

Chilled Tired, Cast Iron Car Wheels

 **W. R. Kerschner Co., Inc.** 

50 Church Street, New York

Miller Trolley Shoe

Adopted by

Atlantic Shore Line

Add another to the big and growing list of Miller Trolley Shoe users.

The Atlantic Shore Line Railway, the famous Maine Coast Railway south of Portland, has recently purchased thirty shoes, the wearing inserts costing 75 cents each, or

Half the Cost of Trolley Wheels

Note the accompanying view of a trial shoe photographed after an 18,000-mile run under No. 00 wire—and still good for weeks. A 5-in. trolley wheel under the same conditions averaged only 7000 miles.

Become a user of the Miller Trolley Shoe if you want economy and certainty in overhead collection of current.

Miller Trolley Shoe Co., West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

SALES REPRESENTATIVES

Alfred Connor,
Denver, Col.

T. C. White & Co.,
St. Louis, Mo.

S. I. Wailes,
Los Angeles, Cal.

F. F. Bodler,
San Francisco, Cal.

W. F. McKenney,
Portland, Oregon.

W. M. McClintock,
St. Paul, Minn.



Additional Evidence

The merits of the "Light-One-Man" unit are thoroughly recognized: it is superfluous to add any word to what Mr. Roslington says.



CAPITAL \$250,000.00

GEORGE ROSLINGTON, PRESIDENT
LLOYD STURGES, SECRETARY

ALBUQUERQUE, N. M.,
December 3rd, 1917.

Mr. Geo. L. Kippenberger,
Special Sales Agent St. Louis Car Co.,
Saint Louis, Missouri.

Dear Sir:

Replying to your inquiry regarding the trucks supplied on your last delivery of light weight cars, I beg to advise that these have been in continuous operation since their arrival; and we have had absolutely no trouble or breakages of any kind in connection with them.

The riding qualities are excellent, and I do not think could be improved upon, although our experience very clearly shows that it is absolutely necessary to maintain the track in first class condition, in order to operate light weight cars with any satisfaction either to the Company or its patrons.

I might add that at the time of the delivery of these last cars we had a recruiting camp at one of our terminals, which taxed our capacity to the utmost. Every night for six weeks these cars with a seating capacity of twenty-six, and a weight of not to exceed thirteen thousand pounds, carried from sixty to ninety able bodied men passengers up and down a $3\frac{1}{2}$ grade - $1\frac{1}{2}$ miles long. Of course, this traffic only existed from seven to eight and from ten to eleven P.M.

During the last month the camp was in Albuquerque we carried over 150,000 passengers, exclusive of transfers, on our eight miles of track with twelve of your light weight cars and two old green cars, which were in operation not to exceed six hours a week each. During that period we did not have one personal accident, and a very small amount of car repairs was necessary.

Yours very truly,

TRJ.

George Roslington
President.

WE HAVE BUILT THREE
LOTS OF THIS TYPE FOR
City Electric Co.,

Albuquerque, N. M.

REPEAT ORDERS
HAVE BEEN EXECUTED
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Aberdeen Ry. Co.,
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St. Louis
Car
Company

Gurney Ball Bearings

370 watt-hours = 1 pound of coal

A recent calculation by W. D. Bearce shows that for general purposes it may be assumed that $2\frac{1}{2}$ lbs. of coal are required to produce 1 kilo-

watt-hour at the bus-bar. Add 10 per cent to cover line losses and you find that every time you can save 370 watt-hours at the motor you save a pound of coal in the boiler room.



One-Man Car built by American Car Company for Stone & Webster. Equipped with Gurney Ball Bearings in motors and main journals.

***Gurney Ball Bearings are now standard equipment
on all Stone & Webster Birney Safety Cars***

ave Coal



Ball Bearings save at least 10 per cent

It is generally conceded that ball bearings on motors and journals will reduce the power consumption about 14 per cent, and it is certainly safe to assume that the saving will be not less than ten per cent (exclusive of current used for heating and lighting).

On a 16-ton city car taking 150 watt-hours per ton mile, the energy saved would be 10 per cent of 2.4 kw.-hours, equal to 240 watt-hours, or $\frac{2}{3}$ lb. of coal per car mile.

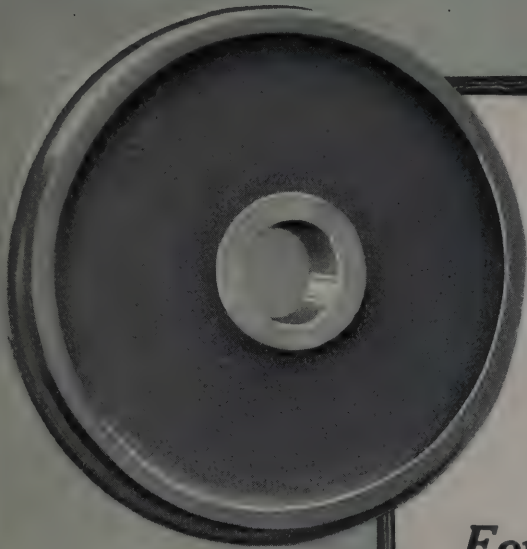
Other advantages of Ball Bearing Journals and Motors are elimination of hot boxes and fallen armatures, perfect alignment of gears, reduced inspection and lubrication expense.

Our Engineers will be glad to recommend suitable bearings for your equipment.

Gurney Ball Bearing Co.

Conrad Patent Licensee

Jamestown, N. Y.



The Wonderful Single-Service Chilled-Iron Wheel

Standard for 67 Years

The Chilled Iron Wheel has performed its every function at a minimum cost.

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95% of all cars in this type of service are carried on Chilled Iron Wheels.

For Street Cars

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of 100 cities in the United States and Canada, operating 100 cars or over.

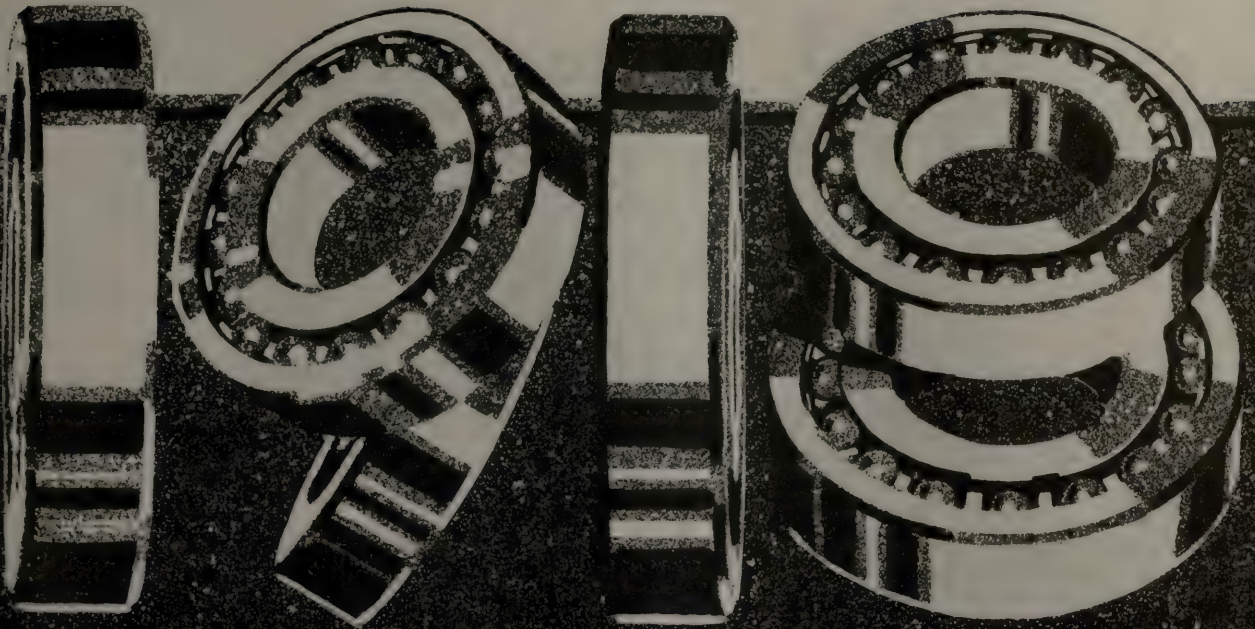
The Conclusion

to be gained from these figures is that the Chilled Iron Wheel gives the Greatest Service for the Lowest Cost.

Association of Manufacturers of Chilled Car Wheels
1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day.





THROUGHOUT the coming year front covers and full-page announcements in this journal will tell the story of increased efficiency in Electric Railway Motors made possible by the use of SKF Ball Bearings. To those who follow the facts to be presented—facts drawn from actual operating service in prominent companies—the year 1918 will most certainly prove a profitable New Year.

SKF Ball Bearing Co.

Hartford, Conn.

SKF
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Gasoline Locomotives

can be run wherever a track is laid, provided clearance limits permit. They are dependent upon no external source of power, and to "charge up" it is simply necessary to refill the gasoline tank.

Electric Railways

can use gasoline locomotives to advantage, especially in and about shops, power plants and terminals. These locomotives can go where it would be unsafe or undesirable to run a third rail or overhead wire, and with reasonably careful handling fire risks are practically eliminated.

Baldwin Gasoline Locomotives

are strongly built for severe service. There are four standard sizes, weighing respectively $3\frac{1}{2}$, 5, 7 and 9 tons, which can be designed for either standard or narrow gauge; and also a 23-ton size, which is built for standard gauge only, and is specially suitable for yard or terminal switching service.

These locomotives are fully described in Baldwin Record No. 85.

THE BALDWIN LOCOMOTIVE WORKS
Philadelphia, Pa.

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WHITE'S Porcelain Trolley Hanger

is so simple to adjust and align on the span wire that it is a big time-saver in installation work.

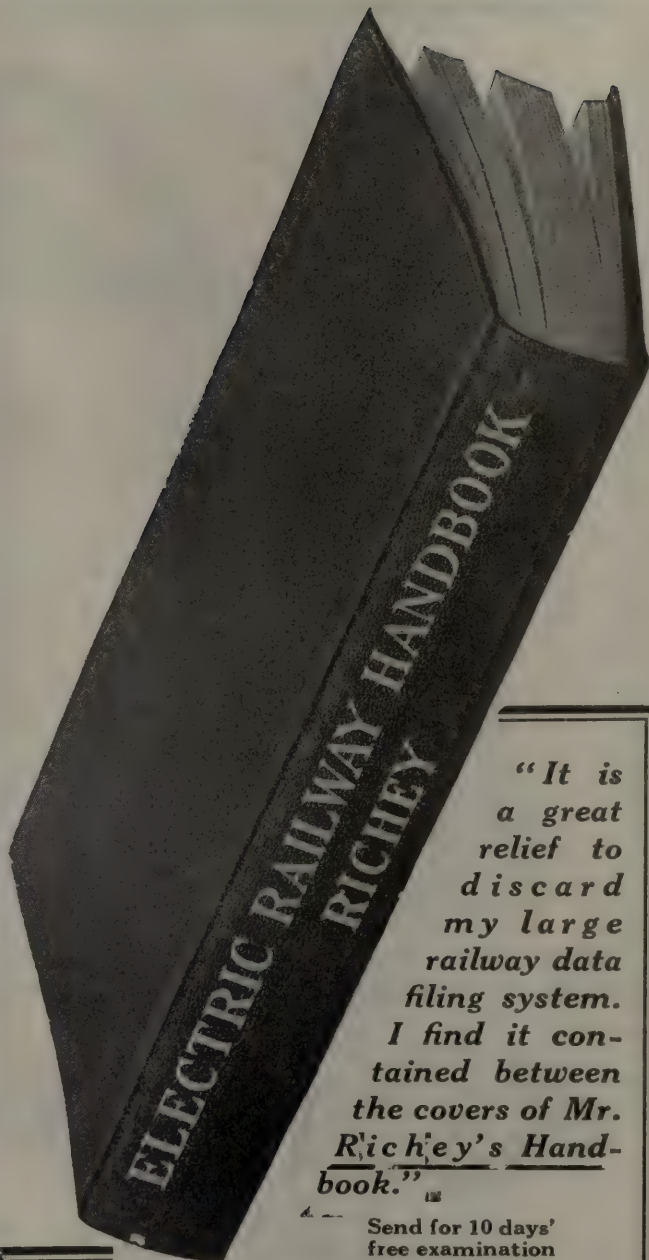
The yoke is sherardized malleable iron, and that doesn't rust; the bolt is a standard, furnished sherardized or in bronze. Those are the three simple parts of this hanger, and they mean economy for you.

Let us send you a sample with quotations on complete hangers or parts which we have in stock for

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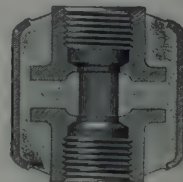
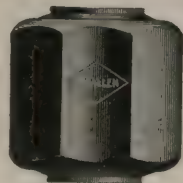
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This pair tested and passed for
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Tested to 10,000 volts.

Unbreakable, semi-soft insulation, bonded to
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Cheaper than plain pliers with detachable
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Made of finest tool steel, specially tempered.

Ask for prices.



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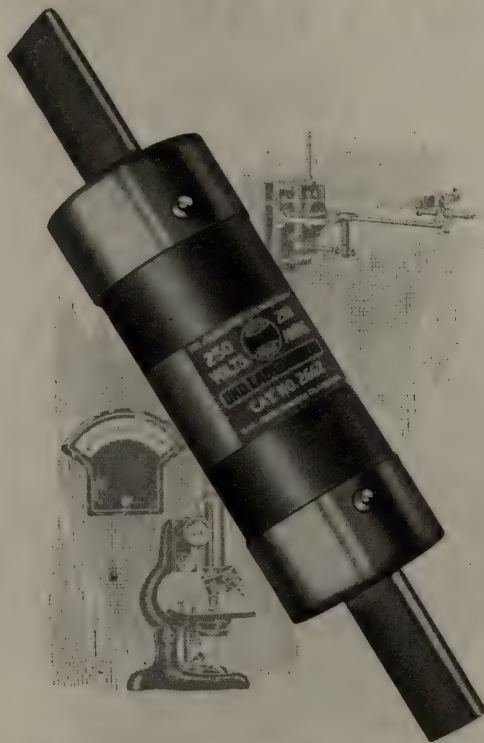
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If it's a split second late some of your equipment will
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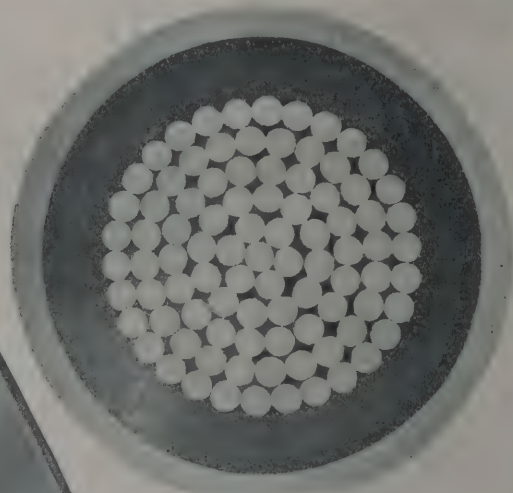
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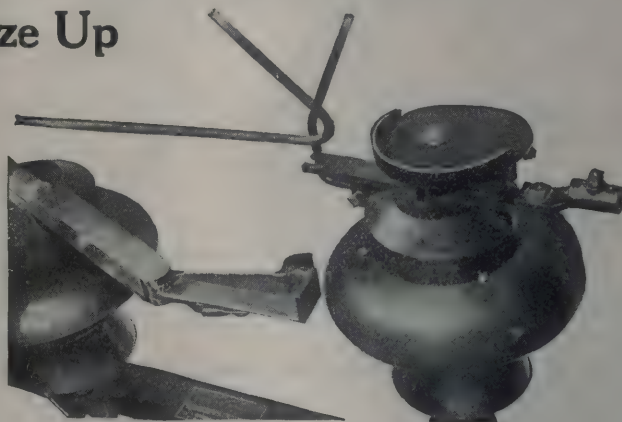
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Will Not Freeze Up

Burke Horn Gap Switch

Sleet hood completely covers flexible leaf brush contact, toggle joint in arm gives increased reliability of break.



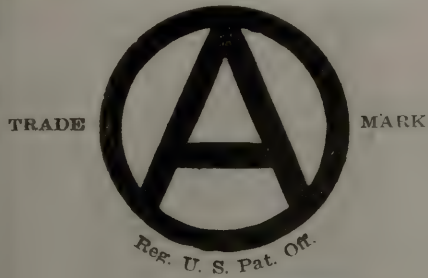
These two cuts show the main contact of the Burke Horn Gap Switch. The lower cut shows the contact closed—Sleet Hood removed.

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Let Us send this Reciprocating Track Grinder to you for a TRIAL

No
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to You

We have shipped machines to scores of electric railways, at our risk and expense.

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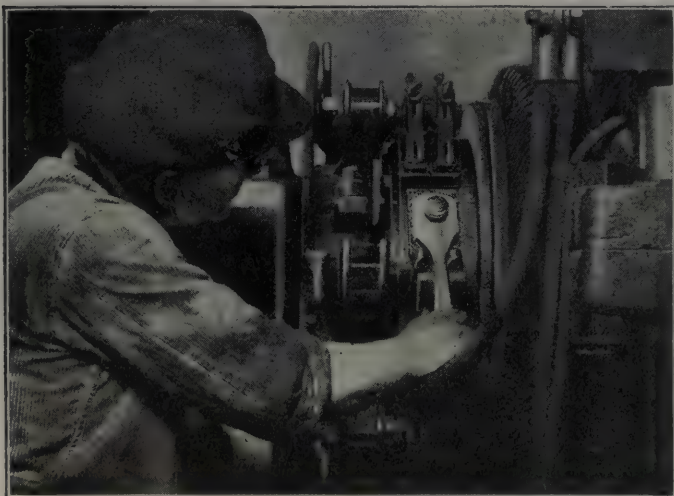
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1. Removes corrugations and cupped joints from rails.
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The Ideal Commutator Resurfacer is a remarkable abrasive composition (non-copper collecting, and non-metallic) which will enable you to put your commutators in smooth, excellent working condition and keep them so.

Inexpensive and conveniently applied with the machine in operation, it is helping hundreds of users to obtain *maximum efficiency* constantly from their electrical machinery at *minimum expense*.

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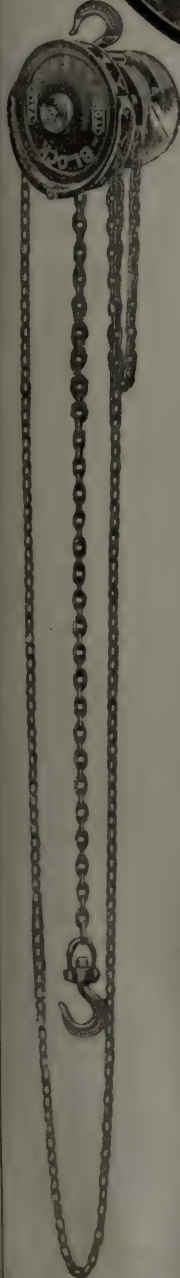
Ideal Resurfacers are obtainable in all sizes and in a fine and coarse grade. Convenient handles are attached to assist in their application to the rotating commutator surface. Write for complete information and prices.

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Tell us the R.P.M., face width, clearance between sets of brushes and condition of your most troublesome commutator and we will forward an Ideal Resurfacer on ten days' trial. Should it fail to satisfy you in every way, return it at our expense; if satisfactory, pay for it.



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Yale spur-gear block setting gas-oil motor



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The use of these non-abrasive brushes results in highly finished commutator surfaces and freedom from scoring and destructive sparking. This means increased operating efficiency. Let our Electrical Service Department send you booklet and data sheet No. 108-M.

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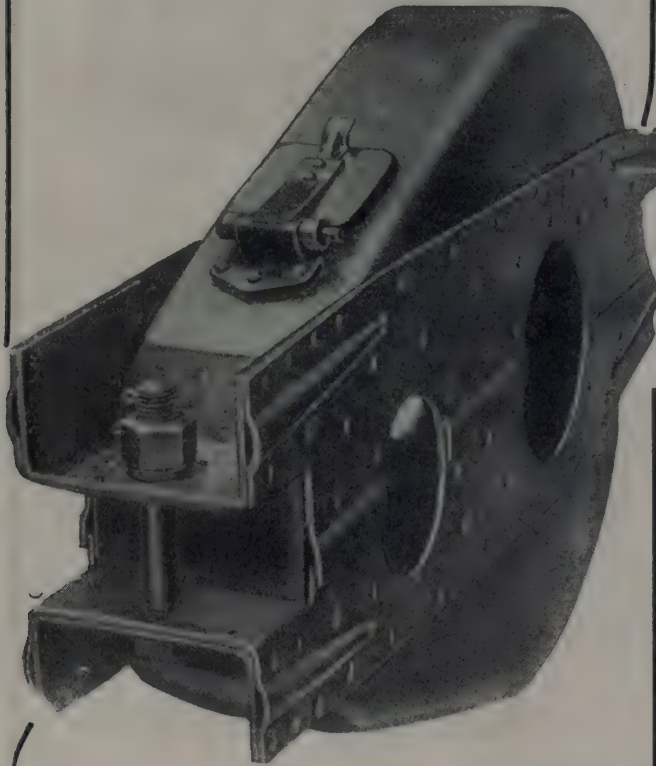


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This feature protects your gears and pinions from water, mud, etc., and prevents oil leakage.

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This feature defies vibration, which is a great menace to rivets.

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are particularly adapted for service in **Railway Motors, Central Stations** and all other types of electrical machines.

These brushes are made in a large number of different shapes and compositions—sufficient to meet any requirements.

They are made from Mexican Graphitic Carbon properly compounded with low resistance carbons and reduce to a minimum the wear on commutator and brush, and practically eliminate power losses in commutation.

They are absolutely uniform in quality set after set and after determining the grade that suits your conditions just repeat the number and you are assured the identical quality again.

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FABRIKOID SEATS

Cost Less and
Wear Better
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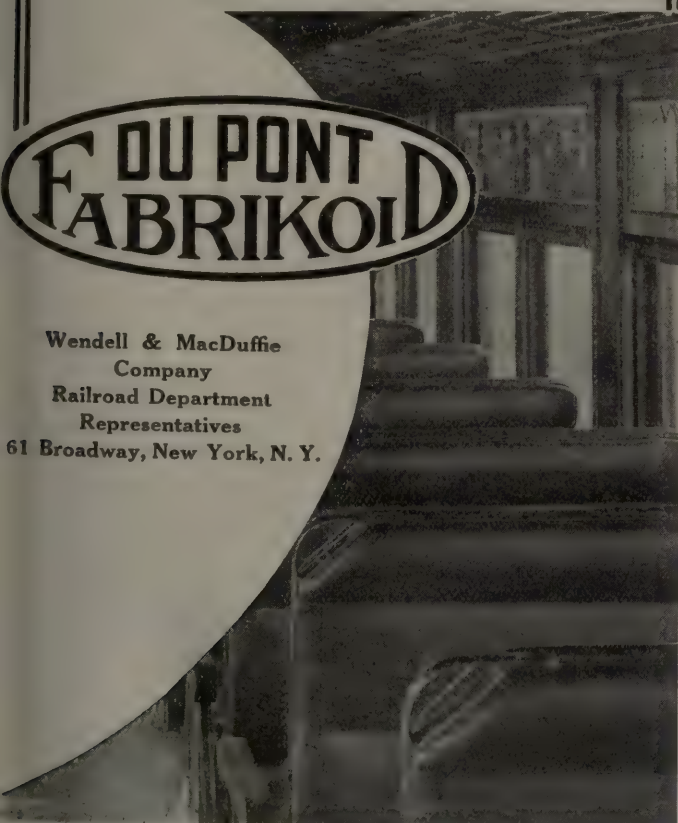
Waterproof — grease proof — stain proof—washable.

Uniform in width, thickness and strength.

Easily applied—very little waste in cutting.

Samples on request. Try them.

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**An Ideal Material
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Your Cars**

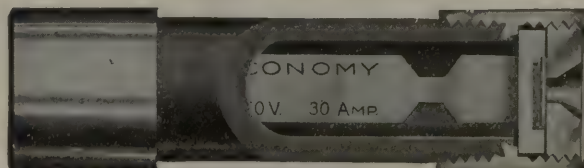


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Don't trust to your more limited facilities for refilling fuses. As fuse specialists, we furnish reliable and carefully *tested Renewal Links* all ready to insert in

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NORTON GRINDING WHEELS

will take care of all your work.

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This is the last word in crank pin presses. The old fashioned hand pump is here replaced by an air engine pump. This not only reduces the number of men required to operate it, but increases the speed. These presses are built in capacities up to 300 tons.

We build wheel presses in all sizes and capacities required in present-day practice, hand operated, belt or motor driven. The press shown here is our patented hydro-pneumatic type in which the ram movements are effected by combined air and hydraulic pressure.

Other machines of our manufacture are benders, bull-dozer, jacks, pit jacks, shaft straighteners, rail benders, punches, shears, wheel presses, forcing presses, forging presses, crank pin presses, pumps, accumulators, valves, etc.

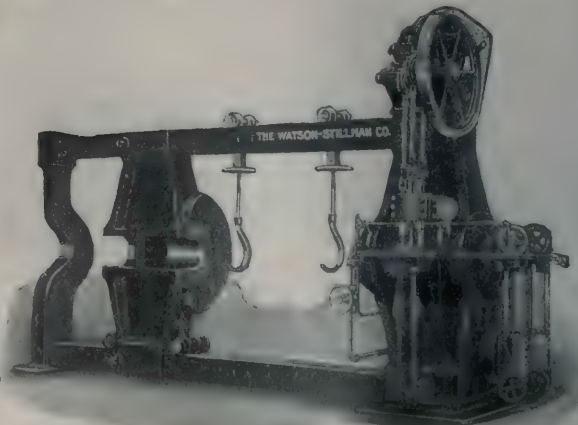
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96 Church Street, New York
Chicago: McCormick Bldg.

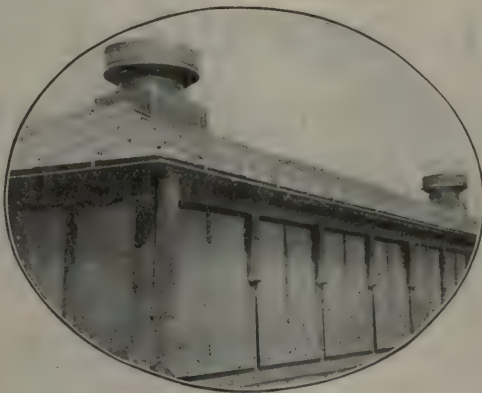


399



600 Ton Hydro-Pneumatic Wheel Press

"ANTI-PLUVIUS"
(Trade Mark)
Puttyless Skylights
Patented



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On duty for a lifetime

Continued, consistent service is the story of "ANTI-PLUVIUS" Puttyless Skylights on car houses, shops, power houses and substations throughout the country. The Drouvé design has exclusive features you should know before deciding your next skylight problem. Ask us what they are.

The G. Drouvé Co., Bridgeport, Conn.
(180 N. Dearborn St., Chicago)

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C. I. EARLL
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What is the ratchet-winding feature?

What is the emergency release?

What are the inter-locking pawls?

What is the free-winding tension spring?

How is it that the Earll Tension Springs are adjusted from the front without taking catcher or retriever from car?

How is it that the Earll Catchers and Retrievers weigh only about half as much as other makes?

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For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels



As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoos" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

Write Today.

STAR BRASS WORKS

KALAMAZOO, MICHIGAN



This is the Griffin F. C. S. Wheel

The surface of tread and flange contains three and one-half per cent carbon white iron, harder than tool steel, insuring long wear.

The softer hub permits easy machining.

It is a wheel where the metal is so distributed that each part is particularly adapted to the requirements demanded of it.

The arched face plate gives additional strength.

Over 200,000 F. C. S. wheels are in use under city and interurban electric railway cars throughout the country.

The low friction between rail and flange keeps the flange wear and danger of derailment down to a minimum.

GRIFFIN WHEEL COMPANY

McCormick Building, Chicago, Ill.

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The Road to Mt. Vernon is

BOYERIZED

The Washington-Virginia Railway, which operates a high-speed train service to Mt. Vernon is another thoroughly Boyerized road.

It bushes everything that can be bushed. And uses Boyerized pins and Boyerized brake-hanger holders as well. Some Boyer bushings have been in service more than two years.



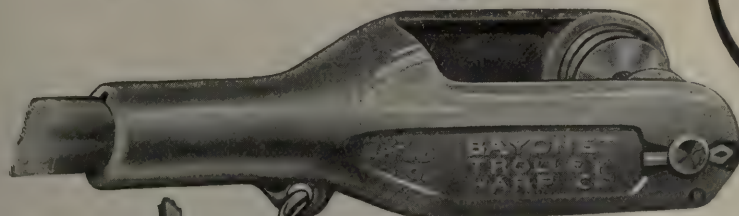
**Boyerized Products
are Standard
on Scores and Scores
of Railways**

**Bemis
Car Truck Co.
Springfield, Mass.**

High Speed!



**10
Seconds**



Bayonet Trolley Harps and Sleet Cutters are our pride. We have spared no effort in experiment and improved manufacture to produce Trolley Harps that are superior in durability, conductivity and time saving convenience.

Self-Lubricating. Non-Breakable. Poles Changed in One Minute.

Bayonet Anti-Friction Base has all wearing parts bushed.

Ten seconds only required to change complete "Bayonet" Trolley harp and wheel by hand. Repairs made at the bench instead of on the pole.

The Bayonet Trolley Harp Co., Springfield, Ohio

Please send me particulars of your Trolley Equipment, which I would like to try out on one of my company's cars in accordance with your 60 days' approval plan.

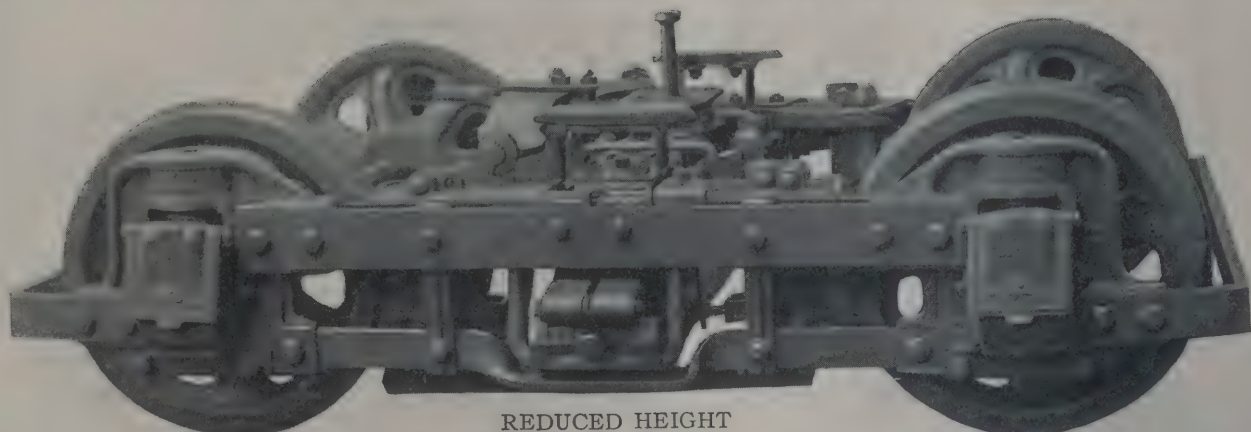
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Company

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REDUCED HEIGHT

TAYLOR R. H. TRUCK

Mounted on 26 Inch Wheels With Springs Over Journal Boxes
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SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car
Bodies weighing 16,000 to 22,000
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EASY
RIDING

Journals $3\frac{3}{4} \times 7$ M.C.B. Type.
Height from Rail to Body Bolster,
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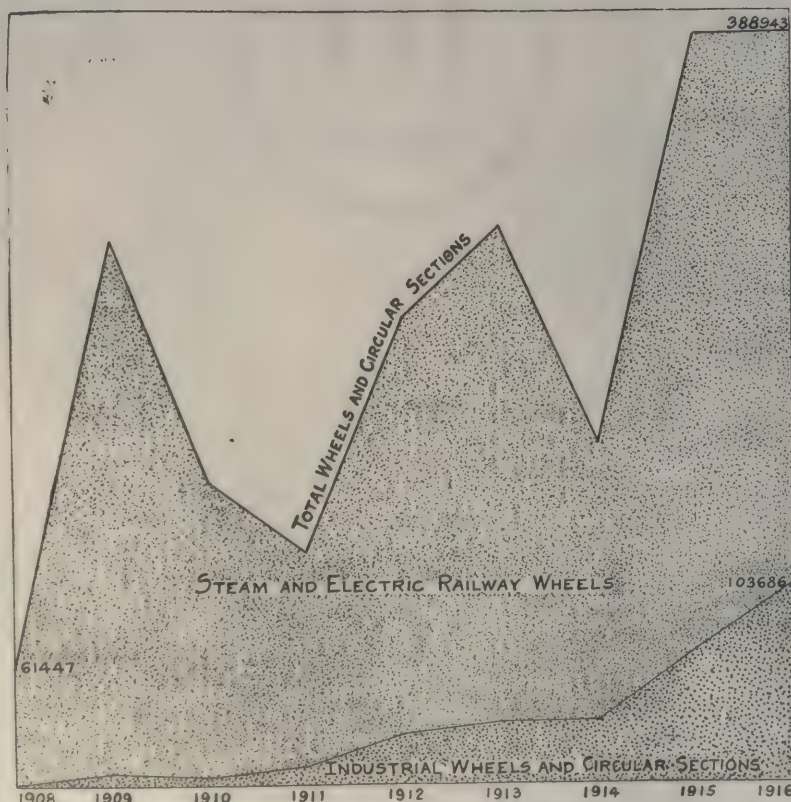
TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

Established 1892

SPECIFICATIONS ON REQUEST

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Steel for Service



That the Solid Rolled Steel Wheel has made its place in modern steam, electric and industrial railway service is graphically illustrated in the chart which shows, by years, rolled steel wheels made by this company.

The total contour line indicates that while in the main sales of solid steel wheels have followed and been affected by the peaks and valleys of the car buying movements, there has been a progressive increase in the number manufactured. The number of steam and electric railway wheels purchased in any year is somewhat commensurate with the number of cars purchased in that year.

So far as industrial wheels are concerned, the lower area shows a continuous increase, which in the last three years has been decidedly marked. The experimental stage has, therefore, been passed, and the solid steel wheel for industrial purposes may be considered as firmly established in the confidence of users.

There is a reason: the merits of the solid steel wheel are many and are well worth careful consideration by the user. To furnish such information is a part of the service this company very gladly renders. It offers its technical skill to any user who desires to bring his equipment to the highest standard of efficiency based on ultimate economy in expenditure.

Carnegie Steel Company

General Offices: Pittsburgh, Pa.

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



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THESE OFFICES WILL GIVE YOU THE BEST THERE IS IN INSURANCE SERVICE

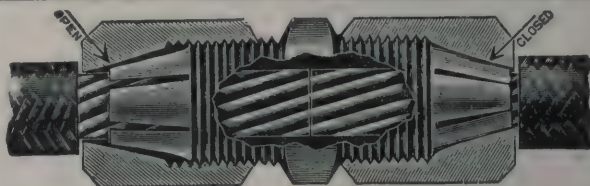
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make of chassis.
Make a low,
well-balanced
outfit on the
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in use.

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Makes Splices Easy to Open Up, Too

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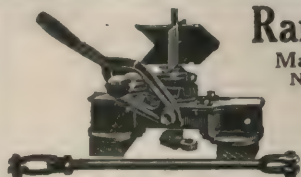
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Crossings, Switches, Etc.



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transmission structures on 12 mile 66,000 volt line of Keene Gas & Electric Co., from Keene to Marlboro and Dublin, N. H.

Three No. 2 stranded copper conductors with 7/16 steel ground wire.

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Maximum, 600 ft.

38 ft. to low wire.

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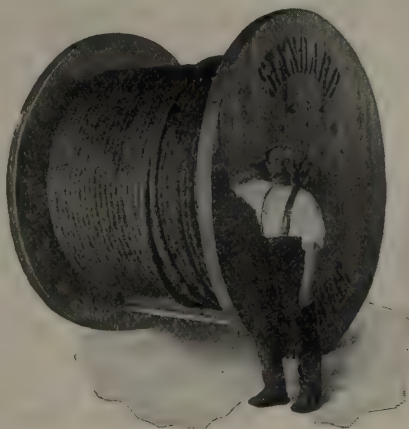
Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.

We have constantly on hand about two thousand tons of steel and can make immediate shipments.

A full line of convenient malleable fittings.

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means ability to supply promptly high quality electric wires, cables and accessories of all kinds at reasonable prices.

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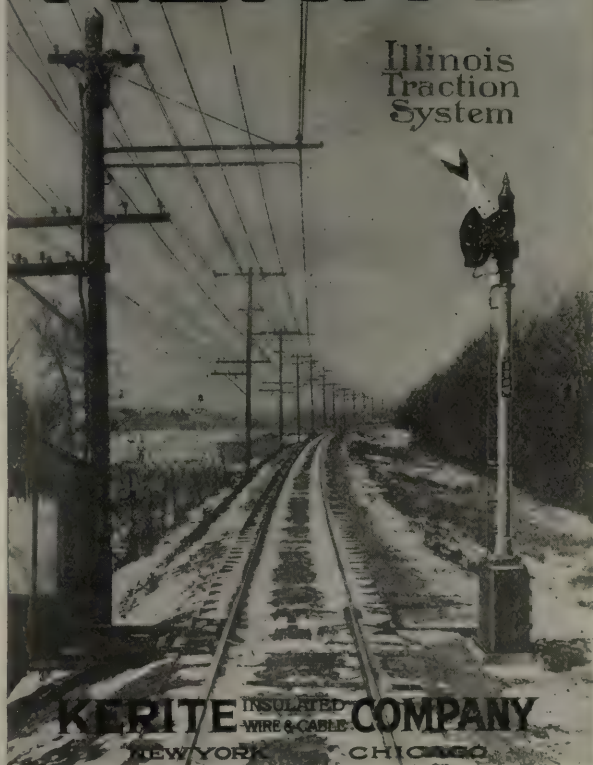
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Branches in all principal cities.
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stand up
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running at
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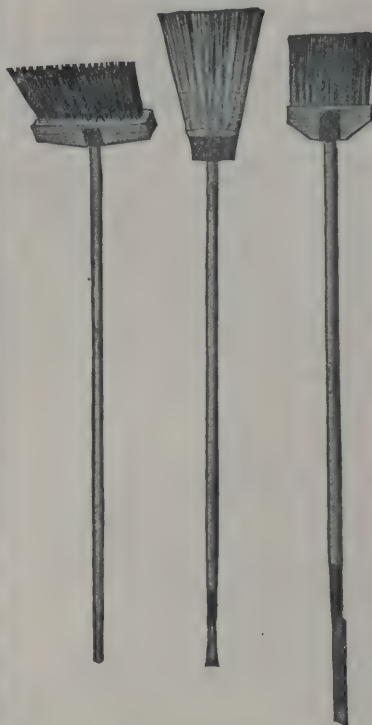
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as standard material. This is not to be wondered at when you consider the "ACME" strength, permanence, economy and ease and speed in handling.

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MANUFACTURERS
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No. 1 to sweep crossings.

No. 2 to handle light dirt and snow in the frogs, switches, and curves.

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SWITCHES
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COMPLETE
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Established 1858

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Special Work for Street Railways

Frogs, Crossings, Switches and Mates

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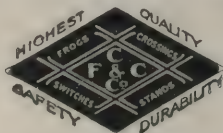
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Let us have your address and the booklet will be forwarded at once.

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If you know anything Good
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TALK ABOUT IT

Otherwise—don't talk
Boost the Railroads and
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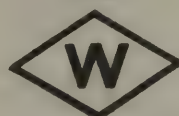
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For Protection Always
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The most popular
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232

CONSERVES energy
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Bulletin No. 1 Green Chain Grate Stokers.
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Self Operating D. C. Sub-Stations

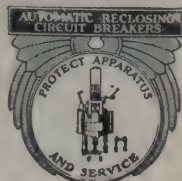


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Equipped With AUTOMATIC RECLOSING CIRCUIT BREAKERS

These remarkable protective devices open in case of overload or short circuit, and reclose automatically upon removal of same. They can also be arranged to automatically shut down the machine in case of hot bearings, Hot Transformers, A. C. Voltage Failure, Reverse Current overspeed, etc.

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Catalog 28 contains complete descriptions of fuses and cutouts for railway service. Write for a copy.

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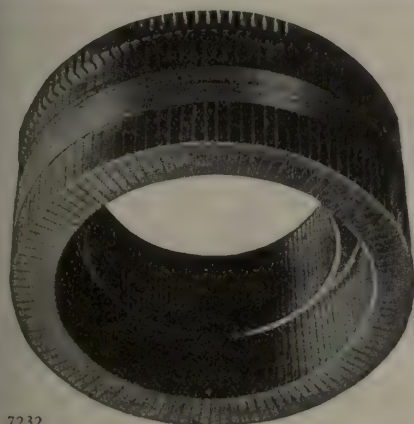
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Cameron Commutators Command Confidence. Why?

Because of the dense, high conductivity hard-drawn copper we put into the bars.
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Because of the Cameron ideal of quality—and the painstaking inspection that guarantees it in every job we turn out.
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Will not dry out.
High in insulating qualities.
The most durable tape made.

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Linseed oil treated Cambric, Linen, Silk, Canvas, Duck and Papers. Flexible, efficient under high temperature.

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Never Unravels



The Safety
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"FASTEJ" Tape

Has a Dependably Fast Edge—Is Fully as Satisfactory under All Conditions of Service as the Very Best Woven Tape; yet Costs Considerably Less and Is Always Readily Obtained.

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method of reducing delays due to "frozen air," "air failed," "no brakes," "stiff valves," "slow brakes," "brakes failed to release," is with an

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The Cleveland, Alliance & Mahoning Valley R. R. Co. CASH FARE RECEIPT.

Good for one continuous passage between stations notched and for this day and train only.

A tax of eight per cent in addition to the regular fare in excess of 35 cents will be collective after November 1st, 1917.

Retain this receipt until you leave the car, otherwise you may be called upon to pay an additional fare.

C. J. Fisher
General Manager.

PATENTED. THE MACDONALD TICKET & TICKET BOX CO., CLEVELAND, O.

.00	ALLIANCE	ALLIANCE	.03
.05	VINE ST.	VINE ST.	.05
.10	LEXINGTON RD.	LEXINGTON RD.	.10
.15	LINAVILLE	LINAVILLE	.15
.15	HENRY	HENRY	.15
.20	ATWATER	ATWATER	.20
.25	MOFF	MOFF	.25
.30	EDINBURG	EDINBURG	.30
.35	ROOTSTOWN	ROOTSTOWN	.35
.40	WATER WORKS	WATER WORKS	.40
.45	RAVENNA	RAVENNA	.45
.50	N. MILFORD RD.	N. MILFORD RD.	.50
.55	KNAPP ST.	KNAPP ST.	.55
.60	CHARLESTON	CHARLESTON	.60
.65	SEIDEL	SEIDEL	.65
.70	WAYLAND	WAYLAND	.70
.75	EVANS	EVANS	.75
.80	WILCOX	WILCOX	.80
.85	NEWTON FALLS	NEWTON FALLS	.85
.90	MCCLOSKEY	MCCLOSKEY	.90
.95	STOP 26	STOP 26	.95
1.00	LEWIS RD.	LEWIS RD.	1.00
1.05	LEAVITTSDURG	LEAVITTSDURG	1.05
1.10	AUSTIN AVE.	AUSTIN AVE.	1.10
1.15	WARREN	WARREN	1.15
1.20	DOG	DOG	1.20
1.25	BAGGAGE	BAGGAGE	1.25
1.30	EXCESS FARE	EXCESS FARE	1.30

War Tax Collections

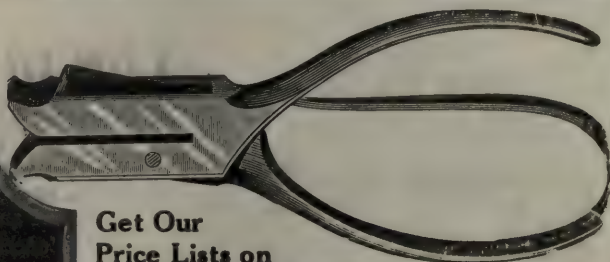
are taken care of automatically where the Macdonald Cash Fare Receipts are used.

The illustration tells the simple story. Issuing these receipts with Macdonald boxes is as simple as tearing a piece of paper.

Send for Sample Holder.

The Macdonald Ticket & Ticket Box Co.

Cleveland, Ohio



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Price Lists on
BADGES and
PUNCHES

AMERICAN RAILWAY SUPPLY CO., 134-136 Charles St., NEW YORK

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company

Waltham, Mass.

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature

Stewart Hartshorn



You will buy

CLEVELAND Fare Boxes

Eventually—

Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO

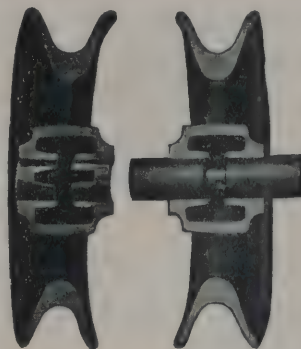
It's Safe if You Used a ROLLER LOCK NUT



It's the only self-tightening nut on the market. Use it as often as you like, but be sure you always use a *Roller Lock Nut*.

ROLLER LOCK NUT CO.

61 Broadway, New York



30 Times Each Second

—that's the rate of speed at which a trolley wheel revolves around its axle, when the car runs at 30 miles an hour.

Do you wonder that it needs lubrication?
And, yet, the

Hensley Trolley Wheel

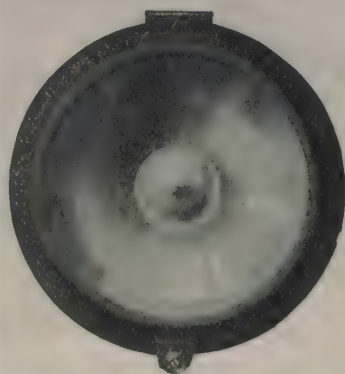
is the only wheel manufactured which is lubricated by force-feed.

Oiled twice-a-week and only three seconds needed to do it thoroughly.

Ask for the Hensley Catalog.

Hensley Trolley & Mfg. Co.

Detroit, Mich.



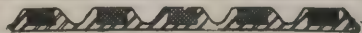
The McLain No. 25 Headlight

gives powerful road illumination, at the same time eliminating glare. It is an extended dash type light made of Pressed Steel throughout, assuring light weight without any sacrifice in strength or durability. It is absolutely waterproof, weather proof and solid.

Concentrated filament type using either a 23 or 36 watt lamp.

It's the **LIGHTEST, BRIGHTEST, TIGHTEST** headlight on the market and it doesn't cost any more than the others.

The Trolley Supply Co., Canton, Ohio



MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning. Above products are used on all leading railways. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices: Lowell, Mass. Branch Offices: Boston New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

What Sherman Said of War

Also applies to snow on your tracks

ROOT SPRING SCRAPERS

are the proper tools for fighting snow and we are in shape to make prompt deliveries. Order now.

Root Spring Scraper Co., Kalamazoo, Mich.

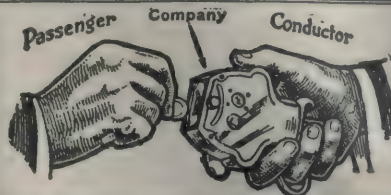


See the Crank of the

CREAGHEAD DESTINATION SIGN

By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.



**Direct
Automatic
Registration
By the
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**Rooke Automatic
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Providence, R. I.**

STANDARD STREET RAILWAY AXLES

ROUGH OR FINISHED TURNED

DIE BLOCKS

MADE FROM ELECTRIC FURNACE STEEL HYDRAULIC PRESS FORGED

Prompt Delivery

GENERAL STEEL COMPANY, Milwaukee, Wis.



AMERICAN CARBON AND GRAPHITE MOTOR AND GENERATOR BRUSHES are selected according to operating conditions. We know brush material—you know your machine. Our combined knowledge will solve your brush problems.

AMERICAN CARBON & BATTERY WORKS E. ST. LOUIS, ILL.
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STUCKI SIDE BEARINGS

are truly frictionless. The roller instead of turning on a pin rolls freely like a rolling pin.

A. Stucki Co.
Oliver Bldg.
Pittsburgh, Pa.

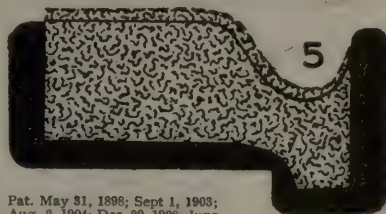
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Especially for Removing Flat Spots

When the tread and flange both need grinding you can do it without removing the car from service by using this type of wheel Truing Brake Shoe.

There are 500 different styles of patterns.

Write for the list of roads using them.



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Wheel Truing Brake Shoe Co.
DETROIT, MICHIGAN

UNION SPRING & MFG. CO. SPRINGS

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M. C. B. Pressed Steel Journal Box Lids

General Office: First Nat'l Bank Bldg.

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S-W Shim Slack Adjusters Save Brakeshoes and Labor

SMITH-WARD BRAKE COMPANY, Inc.
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Saved from the Ashes as many tickets are, means nickels loss to you. Avoid the risk.

Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employees.

It mutilates beyond redemption.

Scrap sold will pay for the machines.

Ask us for Circular J.

PAUL B. PATTEN CO.

78 Lafayette St.,

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U.S.A.

BEACH OIL ELECTRIC CAR

A self-propelled car of the latest type, embodying new and practical features.

Our engineers can help you turn branch line losses into profits.

ELECTRIC CAR & LOCOMOTIVE CORPORATION

Ralph H. Beach, Pres.

165 Broadway, New York, N. Y.

SEARCHLIGHT SECTION

MISCELLANEOUS WANTS

Wanted at Once

For immediate shipment any quantity of battery lead plates, sediment, scrap copper and wire, brass and all other grades of scrap material. Write to us today for our prices. National Metal & Rubber Co., 81 India Wharf, Boston, Mass.

POSITIONS WANTED

ELECTRICAL and mechanical engineer, graduate, 20 years' experience with railway manufacturing and operating companies, 10 years as engineer of car equipment large electric railway system, desires position as chief or sales engineer in New York City. PW1802, Elec. Rwy. Journal.

ENGINEER, graduate 1909, experienced in the construction, operation and management of electric railway, lighting, power and ice plants and transmission systems, desires position as manager or superintendent. PW-1803, Elec. Rwy. Journal.

SUPERINTENDENT of current distribution, with 25 years' experience in this line, desires change. In present position has for several years supervised expenditures exceeding \$100,000 annually for aerial and underground construction and maintenance. Thoroughly familiar with most phases of power distribution work, including accounting, on electric railroad. PW1801, Elec. Rwy. Journal.

TRAFFIC manager, 17 years' electric and steam line experience, desires change. Now employed. Best of references. At present handling one of the largest electric properties in the United States. Thoroughly familiar with every detail of traffic work. PW1761, Elec. Ry. Journal, San Francisco.

General Auditor

Efficient executive, employed by large Middle West public service corporation, solicits change.

Seventeen years' experience (12 years electric railways); age 35, married; references.

Only position with high class public utility considered. P. W., 1795, ELECTRIC RAILWAY JOURNAL, Chicago.

POSITIONS VACANT

CHIEF engineer wanted to take charge of power station consisting of 18-500-hp. Edgemoor boilers served with Green grates, 4-1500-kw. cross compound engines, 1-2500-kw. low-pressure turbine, 1-7500-kw. high-pressure turbine. Salary, \$175 per month, with early advancement. P1793, Elec. Rwy. Journal, Chicago.

DRAFTSMEN wanted experienced in detailing street railway special track work. State experience and salary expected in first letter. Address chief engineer, Buda Co., Harvey, Ill.

DRAFTSMAN wanted in office of engineer maintenance of way. One with railroad experience preferred. Apply at once. The Northern Ohio Traction & Light Co., 224 Hamilton Building, Akron, Ohio.

POSITIONS VACANT

DRAFTSMAN wanted. Man capable of designing, computing and laying out special trackwork for electric and steam railroads. Must be quick, accurate and experienced in this line. Give full particulars with reply and state salary expected. New York Switch & Crossing Co., 15th & Madison Streets, Hoboken, New Jersey.

GENERAL storekeeper—Large railway and lighting company has an opening for a "live wire" man, who can efficiently and economically handle stores proposition, familiarity with market and railroad conditions necessary, and applicant must possess executive ability and force. Exempt men only. Reply should give age, experience, salary required and references. Mahoning & Shenango Railway & Light Co., Youngstown, Ohio.

GENERAL foreman wanted to supervise work in the inspection barn. Will have charge of 19 men and 35 cars, mostly K control and GE-57 and Westinghouse 68 equipment. P1794, Elec. Rwy. Journal, Chicago.

GENERAL superintendent wanted or Southern road. An experienced man of good executive ability; send full information first letter, copies only of recommendations. Must be able to supervise shop and power station operation, track maintenance, and to take charge of transportation department. P1781, Elec. Rwy. Journal.

MAN having experience in way and structure and shop accounting wanted to fill like position with large traction line. Application should state experience, present occupation, age and salary desired. P1800, Elec. Rwy. Journal.

MASTER mechanic wanted by up-to-date street railway system in southwest town of 20,000 population. State age, salary and experience first letter. P-1798, Elec. Rwy. Journal, Chicago.

MASTER mechanic wanted for street railway operating 30 cars. Must be an organizer and systematizer with initiative, familiar with inspection system. Prefer man having experience with W. H.-A. B. control. References required. P-1799, Elec. Rwy. Journal, San Francisco.

SUPERINTENDENT wanted for an electric light and power plant serving several towns with a population of about fifty thousand, who fully understands dealing with the public. Permanent position and good salary to right party. P1792, Elec. Rwy. Journal.

Your Advancement
is largely in
your own hands—it is
doubtful if anyone
else is worrying over it

Better positions are constantly being secured through small advertisements in the "Positions Wanted" Columns

60 cents for 20 words

EMPLOYMENT AGENCIES

Correspondence Service

The undersigned provides a confidential service designed to locate openings through correspondence for men earning not less than \$2,500 and up to \$25,000; all lines. Not an employment service, covering individual negotiations. Established 1910. Complete privacy assured; present connections in no way jeopardized. Send name and address only for explanatory details. R. W. Bixby, H1 Niagara Square, Buffalo, N. Y.

Two Fairbanks-Morse No. 28

GASOLINE SPEEDERS

FOR SALE

The Aurora, Elgin & Chicago R. R. Co.,
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FOR SALE

Electric Locomotive

Weight, 88,000 lbs. 4 G.E.-55, 100 H.P. motors, Type M control, straight and automatic air brake, M.C.B. trucks.

ALBANY SOUTHERN RAILROAD
Rensselaer, N. Y.



Armature Coil Taping Machine

Saves Time,
Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

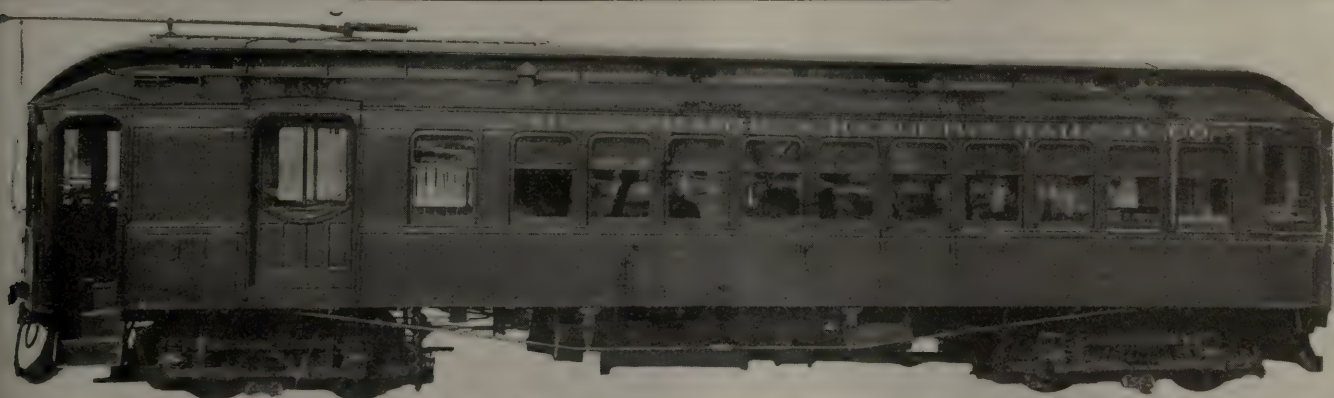
CAR BARGAINS

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT CO.
601 Commonwealth Bldg Phila Pa.

Five Interurban Cars



For Sale by

THE C. E. A. CARR COMPANY

56 Imperial Bank Building, TORONTO, Canada

Brill High Speed Interurbans with Baggage and Smoker

52' 5" over all x 9' 4" over main sills, 10' over grab handles, 13' 10" over trolley board.

Seats: H&K high back walkover, rattan; can be reupholstered, and with paint and varnish cars will be as good as new and look new.

Can be readily converted into straight passenger, seating 60 to 64 passengers, by installing seats in the present baggage compartment.

All wood work, underframing, sheathing roof, ceiling and interior (which is mahogany) in perfect condition. No repairs needed.

TRUCKS: Brill 27E, 6' 6" wheel base, 6" axles, 36" MCB dropped forged steel wheels; most of them new; balance good as new. Special steel axles new. All first class operating condition.

AIR BRAKES: Westinghouse, both automatic and straight air for trailer or train control: can be used as locomotives. GE CP22 25' compressor herring bone tooth type.

WEIGHT: Bodies only 22½ tons.

COUPLERS: MCB Janney passenger or freight; unlocking device in vestibule.

Interchangeable with and can be operated on steam roads.

Equipped with two trolleys and third rail shoes.

Full vestibules each end, steam coach monitor roof Pullman type, flush platforms with trap doors both ends and in the rear on both sides. Underframing composite heavily reinforced with steel.

The type "M" control is practically new in all details, having been installed about four years ago. Balance of equipment is a little over ten years old, but has been kept in the very best of condition. Ready for immediate shipment and service.

*This is a
Real
Bargain.
Write us
at once.*

NOTE—We also have available 10 cars now in service with a seating capacity of 42; G. E. 74 Motors, mounted on Brill 27 E Trucks. These can be released within two weeks. WRITE US FOR FURTHER PARTICULARS.



Wanted:
G-E
Sixty-Six B
Armatures
Second-hand,
but in good
condition.

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Three 300 KW., 60 Cycle, 600/1200 Volt

General Electric Rotary Converters

with

Transformers and Switchboards

FOR PROMPT SHIPMENT

- 3—300 KW. General Electric Rotary Converters, type TC, 3 phase, 60 cycle, 6 pole, 600/1200 volts, 1200 RPM., with speed limit device and starting rheostats.
- 3—300 KW. type HST oil cooled transformers, 3 phase, 12,000/24,000 volts primary, 370/185 volts secondary.
- 3—300 KW., 1200 volt D.C. rotary panels.
- 3—Transformer Panels.
- 2—1200 volt, 500 amp., feeder panels.
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Complete with necessary instruments, bus copper, etc.

We have on hand all classes of Power Machinery

MACGOVERN & COMPANY, Inc.

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IMMEDIATE SHIPMENT

TURBINES

- 2—1000 K.W. Westinghouse Horizontal Turbo Generating sets wound for 2 or 3 phase, 60 cycle, 2300 volts, 1800 R.P.M. Condensing Duty.
- 1—500 KW. General Electric Curtis steam turbine, 3 ph., 60 cy., 1800 rpm., 2300 volts, 150 lb. steam pressure, vertical type.
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DIRECT CONNECTED ALTERNATING UNIT

- 1—800 KW. Allis-Chalmers, 2300 v., 3 ph., 60 cy., 90 rpm. generator, direct connected to 22 and 44 x 48" Reynolds Corliss engine.

60 CYCLE ROTARY CONVERTERS

- 1—300 KW. West. rotary converter, 3 ph., 60 cy., 370 v., A.C., 575 v., D.C., 600 rpm., with 3—185 KVA. Gen. Elec., 60 cy. transformers, 2200-370 volts.
- 1—200 KW. Westg. 3 ph., 60 cy., 720 rpm., Rotary Converter, 575 volts D.C., 360/370 volts A.C.
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will find $\left\{ \begin{array}{l} \text{The man} \\ \text{The position} \\ \text{The plant} \end{array} \right\}$ you want

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Hot Water Heaters

with or without piping. Heaters and pipe in first-class condition. Property now using these heaters to be operated entirely by water power is reason for sale.

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Through plate girder

BRIDGE

designed for 60-ton interurban cars, made up of two plate girders, length 53 ft., depth 4 ft., with suitable floor system.

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- 600 tons 60-lb. A.S.C.E. with angles.
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- Good as new.**
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 - 600 tons 100-lb. Standard with angles.
 - 400 tons 105-lb. 7 in. Grooved Girder. New.

Interurban Cars

- 1—55 ft. passenger and baggage, 4 GE 57 motors, 55 h.p., seats 58 passengers. **Practically new.**
- 1—46 ft. 8 in. passenger trailer. Seats 50 passengers. **Practically new.**

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- 4—30 ft. single-truck, P.A.Y.E.; one-man operation. Seat 28 and 32 passengers. GE 80 motors.
- 7—30 ft. 8 in. single truck. P.A.Y.E. Seat 32 passengers GE 80 motors, 550 to 600 volts

All First-class

Ballast Cars

- 25 Side Dump Cars, 23 yds. cap. Length 22 ft. Standard MCB equipment. Short couplers. Will take 45 ft. radius curve.
- Strictly first-class.**

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85 lb. A. S. C. E. Relayers

16,000 tons—with Angle Bars to match. Available immediate shipment and centrally located.

We positively own these Rails and offer same in carload lots and over. 25,000 tons—Relayers—sizes 25 lb. to 100 lb., in stock our Pittsburgh yards and vicinity.

Immediate shipment guaranteed and prices very attractive. Carload and less than carload inquiries and orders solicited.

Rails cut to length for structural purposes.

Frogs, Switches, Bolts, Nuts, Spikes and all Accessories.

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Park Bldg. Pittsburgh, Pa.

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Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years.

Get Your Wants into the Searchlight

FOR SALE

Motor and Trailer Cars

Immediate Delivery



Provide immediate and adequate SERVICE to war plants and cantonments.

Enable your property to interchange the passenger and freight business with steam railroads now so gladly offered to relieve congestion.

We offer the Brooklyn Motor Cars and the Trailers for passenger traffic in regular train operation, and also the motor cars as

LOCOMOTIVES

to haul express and freight.

These cars can be shipped on their own wheels.

Wire for particulars.

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General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
United States Graphite Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.

Dixon Crucible Co., Jos.

Brush Holders.

Anderson Mfg. Co., A. & J. M.
Eureka Co.

Bushings, Case Hardened Manganese.

Bemis Car Truck Co.

Bushings, Fibre.

Diamond State Fibre Co.

Bushings, Graphite & Wooden.

Bound Brook Oil-less Bearing Co.

Business Instruction.

Alexander Hamilton Institute.

Cables.

(See Wires and Cables.)

Car Equipment. (For Fend- ers, Heaters, Registers, Wheels, etc., see those Headings.)

Car Trimmings. (For Cur- tains, Doors, Seats, etc., see those Headings.)

Cars, Dump.

Differential Car Co.

Cars, Oil-Electric.

Electric Car & Loco. Corp.

Cars, Passengers, Freight, Express, etc.

American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.

Carr Co., C. E. A.
Electric Equipment Co.
Kerschner Co., Inc., W. R.
Wendell & MacDuffie Co.

Cars, Self-Propelled.

Br. Westinghouse Elec. & Mfg. Co.
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper.

Anderson M. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
Frankel Connector Co.
Horne Mfg. Co.
More-Jones Brass & M. Co.

Castings, Gray Iron & Steel.

American B. S. & Fdry. Co.
American Steel Foundries.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.

American Brake S. & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

Catchers and Retrievers, Trolley.

Earl, C. I.
Electric Service Supplies Co.
Holden & White, Inc.
Horne Mfg. Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., C. N.

Casing, Car.

Keyes Products Co.

Certified Public Accountant.

Swan, James T.

Checks, Employees.

American Railway Supply Co.

Chemists.

Little, Inc., Arthur D.

Circuit Breakers.

Automatic Reclosing Circuit Break-
er Co.
Cutter Electrical & Mfg. Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Clamps and Connectors, for Wires and Cables.

Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, M.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Cleaners & Scrapers, Track (See also Snow-Plows, Sweepers and Brooms.)

Brill Co., The J. G.
Ohio Brass Co.
Root Spring Scraper Co.
Western Electric Co.

Clusters and Sockets.

General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery.)

Coasting Recorders.

Railway Improv. Co.

Coil Banding and Winding Machines.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Western Electric Co.

Coils, Armature and Field.

Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.

Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.

Electric Service Supplies Co.
International Register Co.
Johnson Fare Box Co.

Commutator Slotters.

Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Wood Co., C. N.

Commutator Slotting Files.

Handy Supply Co.

Commutator Stones.

Handy Supply Co.

Commutator Truing Devices.

General Electric Co.

Commutators or Parts.

Cameron Elec'l Mfg. Co.
Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Long Co., E. G.
Mica Insulator Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Compounds, Commutator.

Ideal Commutator Dresser Co.

Compressors, Air.

General Electric Co.
Westinghouse Trac. Brake Co.

Condensers.

General Electric Co.
Westinghouse Elec. & M. Co.

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Send those old worn-out coils to us and we'll RE-INSULATE them with

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Eastern Agents for UNION FIBRE CO.
Eastern & Southern Agents for VALLEY STEEL CO.

Conduits, Flexible.
Tubular Woven Fabric Co.

Conduits, Underground.
Johns-Manville Co., H. W.
Standard Underground Cable Co.

Connectors, Solderless.
Dossert & Co.
Frankel Connector Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Br. Westinghouse Elec. & Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Kerschner Co., Inc., W. R.
Westinghouse Elec. & M. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & M. Co.

Converters, Rotary.
General Electric Co.
Westinghouse Elec. & M. Co.

Conveying and Hoisting Machinery.
Columbia M. W. & M. I. Co.
Green Eng'g Co.

Cooling System.
Spray Engineering Co.

Cordage.
Samson Cordage Works.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The.
Long Co., E. G.
Roebbing's Sons Co., John A.
Samson Cordage Works.
Trolley Supply Co.

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., O. N.

Couplers, Car.
Brill Co., The J. G.
Long Co., E. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. Brake Co.

Couplings, Conduit.
Horne Mfg. Co.

Cranes. (See also Hoists.)
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.

Cresosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)

Crossing Foundations.
Balkwill Manganese Crossing Co.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)

Crossings, Track. (See Track, Special Work.)

Culverts.
American Rolling Mill Co.
Bark River B. & Culvert Co.
California Cor. Culvert Co.
Canada Ingot Iron Co., Ltd.
Canton Culvert & Silo Co.
Coast Culvert & Flume Co.
Corrugated Culvert Co.
Delaware Metal Culvert Co.
Dixie Culvert & Metal Co.
Hardesty Mfg. Co., R.
Illinois Corrugated Metal Co.
Independence Culvert Co.
Iowa Pure Iron Culvert Co.
Kentucky Culvert Mfg. Co.
Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
Michigan Bridge & Pipe Co.
Montana Culvert Co.
Nebraska Culvert & Mfg. Co.
Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Co.
Northwestern Sheet & I. Wks.
O'Neill Co., W. Q.
Ohio Corrugated Culvert Co.
Pennsylvania Metal Cul. Co.
Road Supply & Metal Co.
Sioux Falls Metal Cul. Co.
Spokane Cul. & Tank Co.
Tennessee Metal Culvert Co.
Utah Cor. Cul. & Flume Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.
Wyatt Mfg. Co.

WHAT AND WHERE TO BUY

Curtains and Curtain Fixtures.

Brill Co., The J. G.
Du Pont Fabrikoid Co.
Electric Service Supplies Co.
Hartshorn Company, Stewart.
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.

Oxweld Acetylene Co.

Derailing Devices.

Cleveland Frog & Crossing Co.

Destination Signs.

Columbia M. W. & M. I. Co.
Creaghead Eng'g. Co.
Electric Service Supplies Co.

Detective Service.

Wisch Service, P. Edward.

Die Blocks.

General Steel Co.

Door Operating Devices.

Consolidated Car Heating Co.
National Pneumatic Co.
Safety Car Devices Co.

Doors, Asbestos.

Johns-Manville Co., H. W.

Doors and Door Fixtures.

Brill Co., The J. G.
Hale & Kilburn Co.

Doors, Folding Vestibule.

National Pneumatic Co.

Draft Rigging. (See Couplers, Car.)

Drills, Track.

American Steel & Wire Co.
Electric Service Supplies Co.
Long Co., E. G.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand.

Electric Service Supplies Co.
Zelnicker Supply Co., W. A.

Engineers, Consulting, Contracting and Operating.

Archbold-Brady Co.
Arnold Co., The.
Beeler, John A.
Byllesby & Co., H. M.
Ford, Bacon & Davis.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Little, Inc., Arthur D.
Richey, Albert S.
Sanderson & Porter.
Sargent & Lundy.
Scofield Engineering Co.
Sloan, Huddle, Feustel & Freeman.
Stone & Webster Eng'g Corp.
White Companies, The J. G.
Woodmansee & Davidson Engineering Co.

Engines, Gas and Oil.

Westinghouse Elec. & M. Co.

Engines, Steam.

Westinghouse Elec. & M. Co.

Fare Boxes.

Brill Co., The J. G.
Cleveland Fare Box Co.
International Register Co., The.
Johnson Fare Box Co.
Ohmer Fare Register Co.

Fences, Woven Wire and Fence Posts.

American Steel & Wire Co.
Page Steel & Wire Co.

Fenders and Wheel Guards.

Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Root Spring Scraper Co.
Star Brass Works.
Trolley Supply Co.
Western Electric Co.
Wood Co., Charles N.

Fibre and Fibre Tubing.

Diamond State Fibre Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Fibre Insulation.

National Ry. Appliance Co.

Field Coils. (See Coils.)

Filters, Water.

Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus.

Johns-Manville Co., H. W.

Fire-Proofing Materials.

Johns-Manville Co., H. W.

Flooring, Composition.

American Mason Safety T. Co.
Johns-Manville Co., H. W.
Western Electric Co.

Forgings.

Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.

Frequency Meters.

Weston Electrical Instruments Co.

Fuses and Fuse Boxes.

Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Western Electric Co.
Westinghouse Elec. & M. Co.

Fuses, Refillable.

Columbia M. W. & M. I. Co.
Economy Fuse & Mfg. Co.
General Electric Co.
Horne Mfg. Co.

Gages, Oil and Water.

Ohio Brass Co.

Gaskets.

Diamond State Fibre Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas-Electric Cars.

General Electric Co.

Gas Producers.

Westinghouse Elec. & M. Co.

Gates, Car.

Brill Co., The J. G.

Gear Blanks.

Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Wks. Co.

Gear Cases.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Kerschner Co., Inc., W. R.
National Ry. Appliance Co.
Thayer & Co., Inc.
Westinghouse Elec. & M. Co.

Gears and Pinions.

Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
National Ry. Appliance Co.
Nuttall Co., E. D.

Generating Sets, Gas-Electric.

General Electric Co.

Generators.

Dick, Kerr & Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Graphite.

Dixon Crucible Co., Joseph.
Morgan Crucible Co.

Grates, Chain.

Green Eng'g Co.

Greases. (See Lubricants.)

Grinders and Grinding Supplies.

General Electric Co.
Goldschmidt Thermit Co.
Railway Track-work Co.

Grinding Blocks & Wheels.

Norton Co.

Guards, Trolley.

Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.

Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Star Brass Works.
Western Electric Co.

Headlights.

Electric Service Supplies Co.
General Electric Co.
Long Co., E. G.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Headlinings.

Kerschner Co., Inc., W. R.
Keyes Products Co.

Heaters, Car, Electric.

Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water.

Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.

Electric Service Supplies Co.
Smith Heater Co., Peter.

Hoists and Lifts.

Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
Yale & Towne Mfg. Co.

Hose Bridges.

Ohio Brass Co.

Hose, Pneumatic and Fire.

Johns-Manville Co., H. W.

Hydraulic Machinery.

Niles-Bement-Pond Co.
Watson-Stillman Co.

Hydrogrounds.

Horne Mfg. Co.

Inspection.

Elec'l Testing Laboratories.
Hunt & Co., Robert W.

Instrument Transformers.

Weston Electrical Instrument Co.

Instruments, Measuring, Testing and Recording.

Economy Electric Devices Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
Weston Elec'l Instrument Co.

Insulating Cloths, Paper and Tape.

Anchor Webbing Co.
Diamond State Fibre Co.
Freyberg Bros., Inc.
General Electric Co.
Hope Webbing Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Mechanical Rubber Co.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Packard Electric Co.
Standard Paint Co.
Standard Underground Cable Co.
Standard Woven Fabric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Insulation. (See also Paints.)

Anderson M. Co., A. & J. M.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Mechanical Rubber Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Standard Varnish Works.
Western Electric Co.
Westinghouse Elec. & M. Co.



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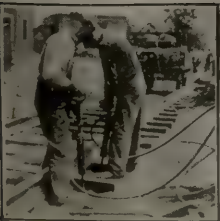
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Denver



Indianapolis



Cleveland



St. Paul



New York



Rochester

Insulators. (See also Line Material.)

Anderson M. Co., A. & J. M.
Creaghead Engrg. Co.
Drew Elec. & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Locke Insulator Mfg. Co.
Macallen Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
White Elec. Supply Co., T. C.

Insulator Pins.

Hubbard & Co.

Insurance, Fire.

Marsh & McLennan.

Inventions, Developed and Perfected.

Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts.)

Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
National Ry. Appliance Co.
Templeton, Kenly Co., Ltd.
Watson-Stillman Co.

Joints, Rail.

Atlantic Welding Co.
Carnegie Steel Co.
Rail Joint Co.
Zelnicker Supply Co., W. A.

Journal Boxes.

Bemis Car Truck Co.
Brill Co., The J. G.
Gunney Ball Bearing Co.
Long Co., E. G.
Railway Roller Bearing Co.

Junction Boxes.

Johns-Manville Co., H. W.
Standard Underground Cable Co.

Laboratories.

Elec'l Testing Laboratories.
Little, Inc., Arthur D.

Lamp Guards and Fixtures.

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Arc and Incandescent.

Anderson M. Co., A. & J. M.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Signal and Marker.

Ohio Brass Co.

Lathes, Car Wheel.

Niles-Bement-Pond Co.

Lighting Regulators, Car.

Holden & White, Inc.

Lightning Arresters.

Horne Mfg. Co.
Railway & Ind. Eng. Co.

Lightning Protection.

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)

Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Creaghead Engrg. Co.
Diamond State Fibre Co.
Dick, Kerr & Co.
Dossert & Co.
Drew Elec. & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Holden & White, Inc.
Hubbard & Co.
Johns-Manville Co., H. W.
Locke Insulator Mfg. Co.
Macallen Co.
More-Jones Brass & M. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse Elec. & M. Co.
White Elec. Supply Co., T. C.

Locks.

Yale & Towne Mfg. Co.

Locomotives, Electric.

Baldwin Locomotive Works.
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & M. Co.

WHAT AND WHERE TO BUY**Lubricating Engineers.**

Galena-Signal Oil Co.

Lubricants, Oil and Grease.

Borne, Serymaer Co.
Dearborn Chemical Co.
Dixon Crucible Co., Jos.
Galena-Signal Oil Co.

Lumber. (See Poles, Ties, Posts, etc.)**Machine Work.**

Columbia M. W. & M. I. Co.
Holden & White, Inc.
Horne Mfg. Co.

Machine Tools.

Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.
Watson-Stillman Co.

Manganese Parts.

Bemis Car Truck Co.

Mats.

Johns-Manville Co., H. W.

Meters, Car, Watthour.

Economy Electric Devices Co.

Meters. (See Instruments.)**Mica.**

Long Co., E. G.
Macallen Co.
Mechanical Rubber Co.

Mirrors for Motormen.

Drew Electric Mfg. Co.

Motormen's Seats.

Electric Service Supplies Co.
Wood Co., C. N.

Motor Generator, Bonding and Welding.

Lincoln Bonding Co.

Motor Leads.

Dossert & Co.

Motor Trucks, Gas and Electric.

General Vehicle Co.

Motors and Generators Sets.

General Electric Co.

Motors, Electric.

Br. Westinghouse Elec. & Mfg. Co.
Dick, Kerr & Co.
General Electric Co.
Western Electric Co.
Westinghouse Elec. & M. Co.

Nuts and Bolts.

Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.
Long Co., E. G.
National Ry. Appliance Co.
Roller Lock Nut Co.

Oils. (See Lubricants.)**Overhead Equipment. (See Line Material.)****Oxy-Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)****Packing.**

Diamond State Fibre Co.
Electric Service Supplies Co.
Johns-Manville Co., H. W.
Mechanical Rubber Co.
Power Specialty Co.

Packing Rings.

Johns-Manville Co., H. W.

Paints and Varnishes. (Insulating.)

General Electric Co.
Holden & White, Inc.
Johns-Manville Co., H. W.
Long Co., E. G.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Packard Electric Co.
Standard Paint Co.
Standard Varnish Works.

Paints and Varnishes. (Preservative.)

Dixon Crucible Co., Jos.
Johns-Manville Co., H. W.
Long Co., E. G.
National Ry. Appliance Co.
Standard Paint Co.

Paints and Varnishes for Woodwork.

National Railway Appliance Co.

Paving Material.

American B. S. & Fdy. Co.
Barrett Co., The.

Paving Pitch.

Barrett Co., The.

Pickups. (Trolley Wire.)

Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., C. N.

Pinions. (See Gears.)**Pins, Case Hardened, Wood and Iron.**

Bemis Car Truck Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.

Pipe.

National Tube Co.

Pipe Fittings.

Power Specialty Co.
Standard Steel Works Co.
Watson-Stillman Co.

Pliers, Insulated.

Rubber Ins. Metals Corp.

Pole Sleeves.

Drew Electric & Mfg. Co.

Poles, Metal Street.

Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Hubbard & Co.
National Railway Appliance Co.

Poles, Ties, Posts, Piling and Lumber.

Carney & Co., E. J.
Lindsley Bros. Co.
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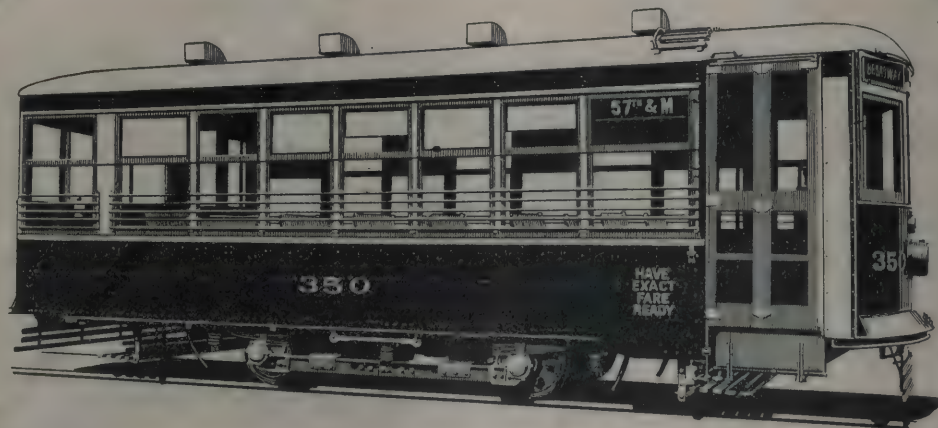
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This saving of 9 per cent in running time is almost the equivalent of 9 cars for 10 for the same car mileage!

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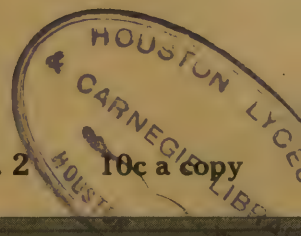
ELECTRIC RAILWAY JOURNAL

New York, January 12, 1918

McGraw-Hill Company, Inc.

Vol. 51, No. 2

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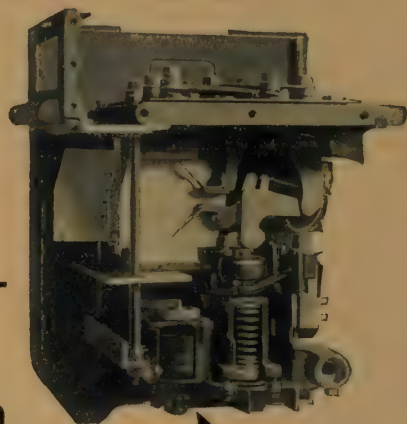
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Wait for No Man

Neither Does the March of Progress

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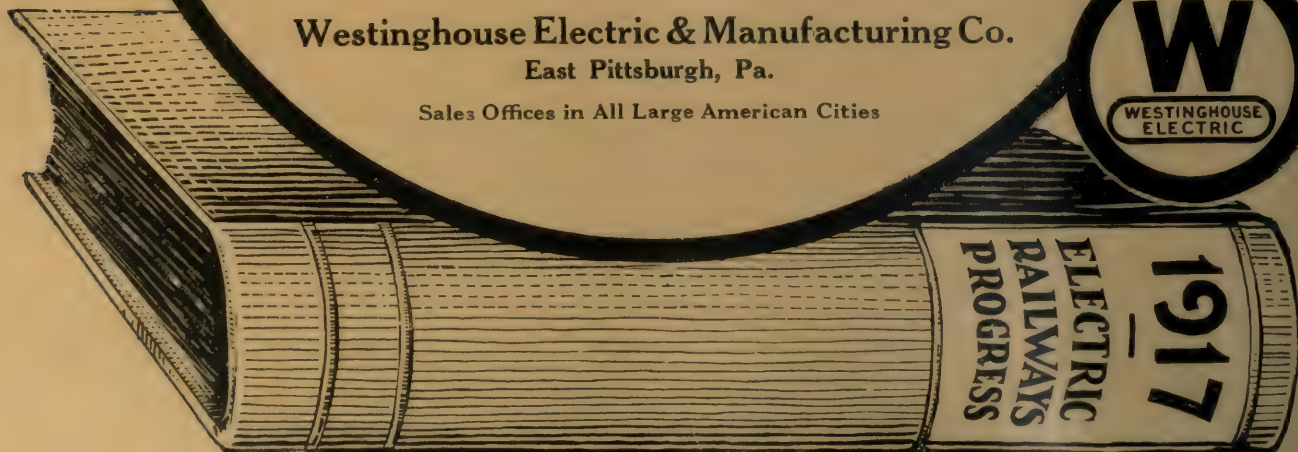
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Electric Railway Journal

Vol. 51, No. 2

Pages 69 to 116

H. W. BLAKE, Editor

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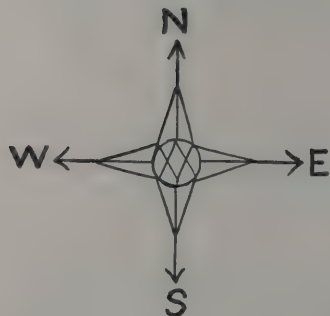
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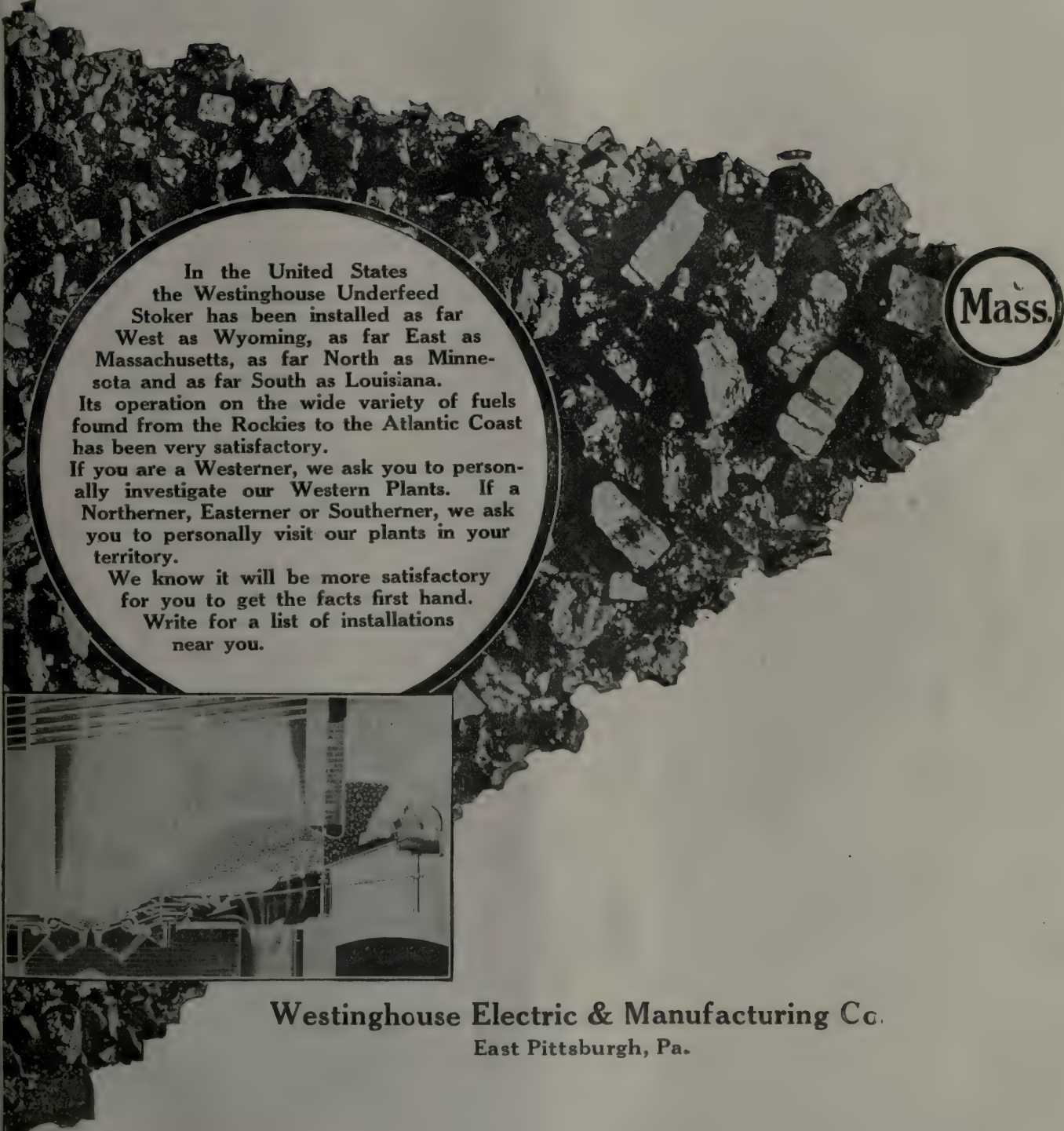
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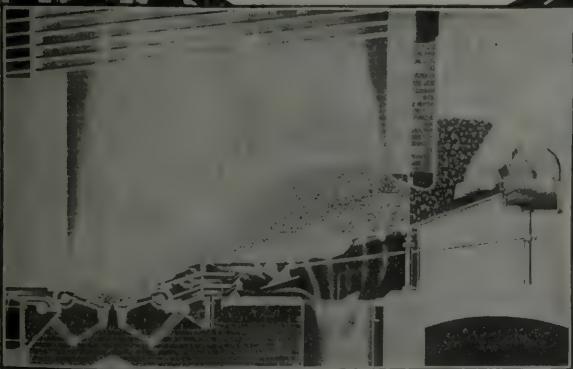
Its operation on the wide variety of fuels
found from the Rockies to the Atlantic Coast
has been very satisfactory.

If you are a Westerner, we ask you to person-
ally investigate our Western Plants. If a
Northerner, Easterner or Southerner, we ask
you to personally visit our plants in your
territory.

We know it will be more satisfactory
for you to get the facts first hand.

Write for a list of installations
near you.

Mass.



Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Automatic Control For Substations



Automatic control for substations has been made practicable by producing an assembly of existing equipment to switch substation machines with simplicity. It is an adaptation of well-known Westinghouse automatic motor-control apparatus, which switches substation equipment exactly as in manual operation.

The secret of its success is using proven apparatus on a fundamentally sound basis.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Meet the Wear at Its Source

That's what we do when we build into our air brakes those wear-resisting qualities obtained only by use of best designs, best materials and skilled workmanship. We weave into the fabric itself the element of enduring quality.



Brake Building our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.
Boston, Mass.
Chicago, Ill.
Columbus, O.

Denver, Col.
Houston, Tex.
Los Angeles, Cal.



Mexico City
New York, N. Y.
Pittsburgh, Pa.

San Francisco
Seattle, Wash.
St. Louis, Mo.
St. Paul, Minn.



33,000 volt line on Bo-Arrow arms and Peirce Pins; 2200 volt primary on wood arms with Peirce clamp pins; 440 volt secondary on Peirce secondary racks. (Pittsburgh, Pa.)



One 33,000 volt line on Bo-Arrow arms and Peirce Forged Steel Pins. Two 33,000 volt lines on Steel Angle arms and Peirce pins. (Pittsburgh, Pa.)

Bo-Arrow Steel Cross Arms and Peirce Pins

carry the lines of the Duquesne Light Co. of Pittsburgh, Pa., through a district where atmospheric conditions are the worst possible for line equipment.



The threads of the thimble fit loosely over the threads of the pin, and a thin cork disc is provided between the top of the pin and the thimble. Under expansion the pin simply rides up further in the thimble, the cork disc compressing. None of the strain is communicated to the insulator.

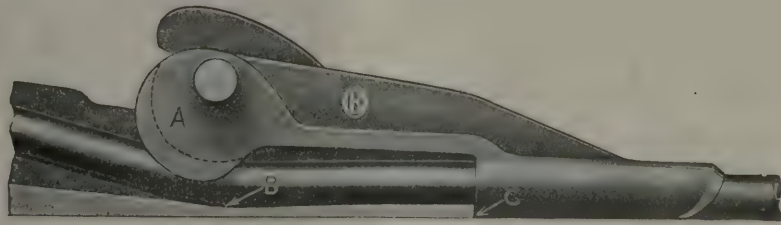
Peirce pins are guaranteed to stand strains equal to their rated strength with a deflection of less than 10 degrees, and without danger to the insulator.

Our booklet tells about "Continuity—and How" to obtain it. Send for a copy.

The Hardware MAKES the Line—Hubbard makes THE Hardware

HUBBARD AND COMPANY
PITTSBURGH

Canadian Manufacturers and Distributors: Acme Stamping & Tool Works, Hamilton, Ontario



O-B Cam Tip (Patented) installed. End of device sectioned to show cam action

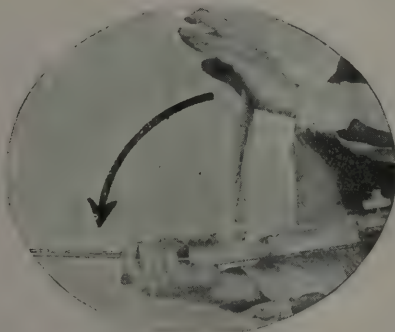
O-B Cam Tips

Where Headways are Short

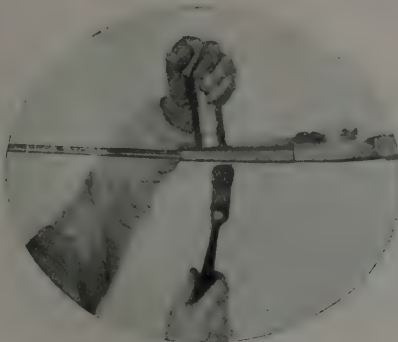
Follow the installation of O-B Cam Tips in the illustrations on the left. They are installed in about one-third of the time it takes to put on old-style bolted tips.



Slip tip under hooks—



Turn over and down on the wire—



clinch the lips and the job is done.

Renewal is as simple.

When a device with O-B Cam Tips must be installed during the day, there is the least interruption to schedules. Even if the work is done at night when traffic is light, O-B Cam Tips are valuable. For the man on the tower wagon doesn't fumble with a lot of small parts. The installation of Cam Tips is so simple he has scarcely to look.

They are made of tough ductile bronze. They fit snugly on the wire, making a smooth approach for the wheel, and last well under hard service.

You may standardize on O-B Cam Tips, for they are used on different types of O-B Trolley Frogs, Section Insulators, Cross-Overs and Strain Plates, so that all of the usual and most of the unusual requirements of service may be met.

Catalog No. 16

The Ohio Brass Co.
Mansfield, Ohio

Phono-Electric



Is Standard for Seattle Curves

Even where the straight-run service is not severe, there are plenty of opportunities for Phono-Electric on the curve sections.

You want something tougher and more durable than copper to take the grinding at the curve, or the smash of the de-wired wheel.

At such special-work locations a break is far more troublesome than on tangents.

Seattle knows the secret of successful supply of current to the car, namely:

The use of wire most durable for conditions most severe—

That means Phono-Electric!

Bridgeport Brass Company
Bridgeport **Connecticut**

Wasted—

35% to 50% of TRACK MATERIAL

INTERNATIONAL STEEL TWIN TIES

Obviate this wasted material and labor

Of What Engineering Value is the Concrete or Ballast Between Wooden Ties? Absolutely None. It Represents an Economic Loss of Track Material and Labor

Steel Twin Ties are designed to overcome just that condition. The effective tie bearing area is placed at the top of the tie and parallel with the rail.

There is an engineering reason for every ounce of metal in a Steel Twin Tie. The 13 in. x 36 in. trussed plates carry the track loads and the 3 in. channels serve as anchorages and tie rods.

Seven inches of concrete beneath the tie plate puts just that much in effective bearing. An inch more than is usually used. And at the same time the excavation and concrete quantities below base of rail are reduced one-half.

Any way you look at them they are engineeringly right. The longer you delay your purchase of some of these ties the more money you waste in extraneous track materials and labor.

Ask our users if you want our best sales argument. If you are convinced ask us for a quotation and delivery.

Prompt deliveries made from stock



Permanent Track at Less Cost
Any Type Base — Open or Paved Track

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co.,
Los Angeles, Cal.

San Francisco, Cal.
Seattle, Wash.

R. J. Cooper Co.,
Salt Lake City, Utah.

J. E. Lewis & Co.,
Dallas, Texas.

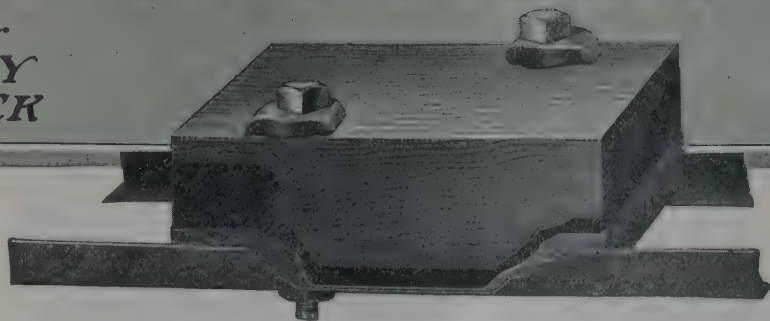
Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.

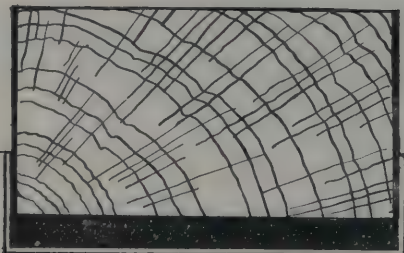
The MECHANICAL RAILWAY TIE

For
CITY
TRACK

For
INTERURBAN
TRACK



The Resiliency of Mechanical Ties Means Longer and Better Service for Track and Rolling Stock



The above sketch shows the method of inserting the asphalt cushions in Mechanical Railway Ties. The asphalt is retained by a sheet of thin metal for the purpose of holding it in place until attached to the angle irons.

The asphalt cushion is the most notable single feature of Mechanical Ties. It forms a rubber-like buffer which serves to absorb the vibrations set up by constantly passing trains and it provides ample expansion facilities to protect track from distortion due to severe temperatures.

Ordinary wood ties have some resiliency, but the Mechanical Tie combines the resiliency of wood and asphalt with the result that no part of the hammering of passing trains is transmitted to the concrete in which the tie is embedded—the pounding which would otherwise pulverize the concrete surrounding the tie is completely absorbed.

And here's another thing: the resiliency of Mechanical Ties means increased comfort to passengers, less noise and longer service from rolling stock.

Why not familiarize yourself with all the details concerning Mechanical Railway Ties? We will gladly supply full information.

The Dayton Mechanical Tie Co.

201 Third Street Arcade

DAYTON, OHIO

Provides the Desirable Qualities of Wood Plus the Strength of Steel, the Permanence of Concrete and the Resiliency of Asphalt—A NonConductor of Vibration

Exceptional Products



Keystone Steel Gear Cases

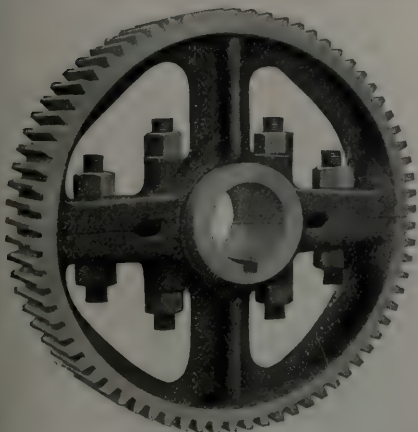
Gear cases must be built of steel of unquestioned strength, unaltered in quality during construction and made to fit exactly the foundations where they are to be installed. And, too, the brackets must be just right and the entire case must be both riveted and electrically spot-welded.

You can get some of these requirements in any gear case, but to get them all in one—you'll use the Keystone.

Keystone Trolley Catchers

Watching the trolley pole and catching it when it "flies" is the work of the Keystone Trolley Catcher. It earns its value over and over again, for each time the pole starts to fly—one less "weak spot" in your overhead can be credited to the Keystone.

Keystone Catchers are the simplest and strongest. You'll see them on the cars of most large railways.



Nuttall Gears and Pinions

Standard and special types of gears for railways, or any kind of a gear or pinion, forged or cast steel, split or solid and of various processes of manufacture to meet varying conditions of service. Put your gear problems up to us—we'll take full responsibility.

Eastern Agents for Nuttall-Pittsburgh.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

The Issue

September 22, 1917



The Wise Management

October 10, 1917

*F. W. Montgomery, President.
D. Montgomery, Vice Pres. & Supt.*

*W. Montgomery, Secy. & Treas.
H. Montgomery, Asst. Secy. & Treas.*

Madison Railways Company

Madison, Wis. October 10th, 1917
McGraw-Hill Publishing Company, Inc.,
239 West Thirty-ninth Street,
New York City.

Gentlemen:

Please send us one dozen copies of your edition of the
Electric Railway Journal of September 22nd, and oblige

Yours respectfully,
Madison Railways Company,

By *[Signature]*

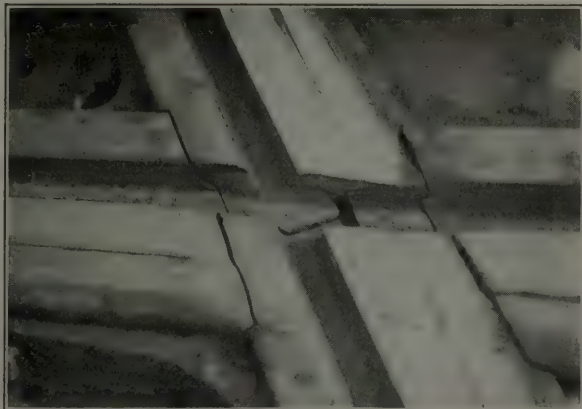
The Happy Ending

From Electric Railway Journal, December 22, 1917

contemplating the purchase of new cars.

Madison (Wis.) Railways has just placed an order with
the American Car Company, St. Louis, Mo., for five new
safety cars.

Scioto Valley Traction Company, Columbus, Ohio, is re-
luctant to be out of the market of which are



What Happens to a Solid Work Crossing



How a Balkwill Crossing Behaves

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of a rolled rail crossing are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill articulated cast-manganese crossing the difficulty is

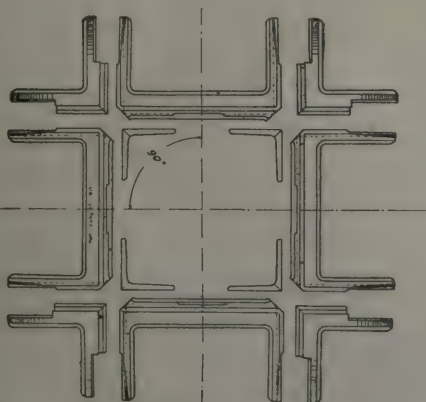
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill crossing. Therefore the Balkwill crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Crossings positively eliminate breakage

**Order Balkwill Crossings
Direct from Your Special Work Manufacturers**

The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio

Abbott Rail-Joint Plates

pay big returns in lengthened track life

PRESERVATION of existing equipment and the directing of expenditures along lines that will get longer usefulness from both old and new material are now a patriotic duty.

This is a time to get track into the best condition to strengthen it for severer service and to provide for subsequent maintenance with least labor and expense.

ABBOTT RAIL-JOINT PLATES are peculiarly desirable for such emergency work, as they can be installed without the delay and expense of replacing the rails, and when so used will add years of life to track that must otherwise be replaced. Such postponement of extensive relaying and renewals is, further, a conservation of labor and steel resources.

The plates can be purchased and the installation completed at a cost that *even under normal conditions* would make a profitable investment.

Don't renew or retamp your old track until you have given our engineers a chance to submit interesting figures.

At least write for our book, "Improved Track Appliances," which describes various forms of the ABBOTT PLATE and other material-time-and-labor-saving track devices.

336



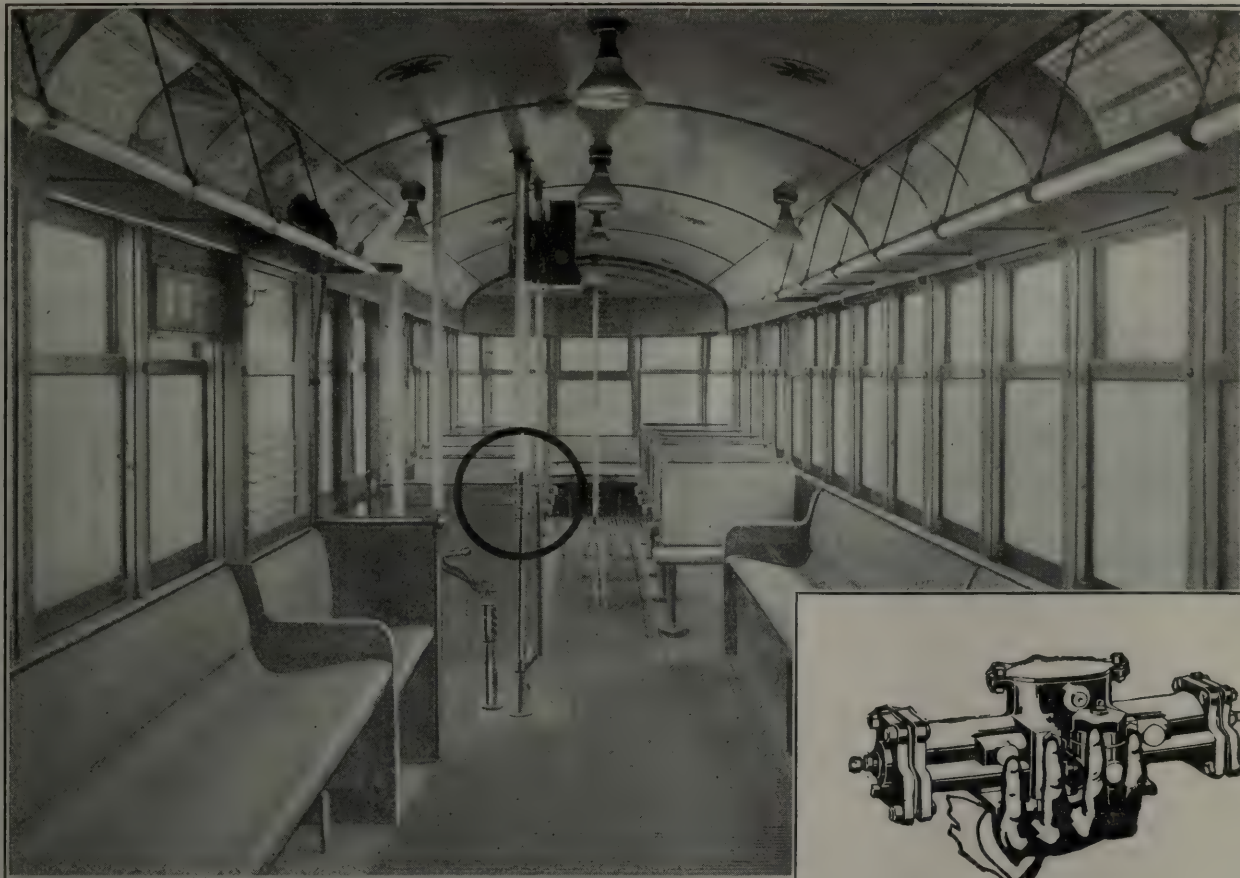
"BUILT LIKE A BRIDGE"



Lackawanna Steel Company

LACKAWANNA, N. Y.

ATLANTA	CHICAGO	DETROIT	ST. LOUIS
BOSTON	CINCINNATI	NEW YORK	SAN FRANCISCO
BUFFALO	CLEVELAND	PHILADELPHIA	HAVANA



National Pneumatic Door and Step Control

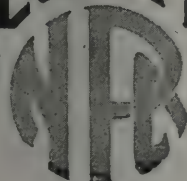
Is on Hundreds of PETER WITT Cars

Many big railways are adopting the Peter Witt pay-as-you-pass car, believing that it represents another advance in fare collection and quicker interchange of passengers.

Cleveland, Toledo, Syracuse, Utica and Schenectady are among the cities, using many of these cars.

Buffalo's Next 100 Cars are also of this type and like all those in the cities named, they will have their passenger-accelerating features made 100 per cent efficient through the use of National Pneumatic Door and Step Control.

NATIONAL PNEUMATIC COMPANY



50 Church St. New York

515 Laflin St. Chicago

What an Effective Power-Saving Campaign Can Do for You NOW

It can save coal. And that was never more desirable for your own good or more essential to the public welfare than it is **now**.

It can secure **now** from your platform men co-operation to a much greater degree than would be possible under any normal conditions. The patriotic appeal is a powerful lever. And the habits formed by your men **now** in the correct, safe and economical operation of cars will produce economies for years to come.



Showing recorder location on one of the 1200 cars of the Connecticut Company

The Arthur Power-Saving Recorder

is a valuable factor in such a campaign.

The following figures show what one company has been able to accomplish in five months by persistent instruction in methods of coal and power saving assisted by the use of Arthur Recorders.

The Connecticut Company New Haven Division

July to November, inclusive

K.W.H. Per Car Mile

Month	1916	1917	% Difference
July	2.985	2.956	0.97% Decrease
August	2.988	2.914	2.48% Decrease
September	2.973	2.882	3.06% Decrease
October	3.142	2.892	7.96% Decrease
November	3.593	3.204	10.84% Decrease

"Power wasted is the true measure of the motormen's relative efficiency."

The Arthur Power-Saving Recorder Co.
New Haven, Conn.



View near Forty-Second Street, New York, from a school house between Second and Third Avenues in 1868.

This Picture of Forty-Second Street, New York

was made fifty years ago. At that time people rode in horse-drawn coaches and Forty-Second Street was "up-town." During the next thirty years the city was extended to the southern borders of Yonkers and Mount Vernon, and to include all of Kings County, Staten Island and a portion of Queens.

The development of this immense new territory, and of a great part of Manhattan itself, would have been almost impossible without quicker and better transportation than was afforded by the horse-drawn coach.

This need was met promptly and the electric railways have been a tremendous factor in accelerating the development of New York City.

Whereas in 1897 New York had 500 miles of street railway, to-day there are 2500 miles of electric lines at the service of millions of its people. Now an 11-mile trip from Forty-second Street to Van Cortland Park is made in only 34 minutes for the same fare that was charged to travel 3 or 4 miles a few years ago under comparatively unpleasant conditions.

Galena Oils

have been a factor in the development of our electric roads just as these roads have played a big part in the development of New York and other cities.

During the past half century of rapid transit development Galena lubricating materials and service have completely demonstrated their ability to meet every requirement.

Galena-Signal Oil Co.

Franklin, Pa.

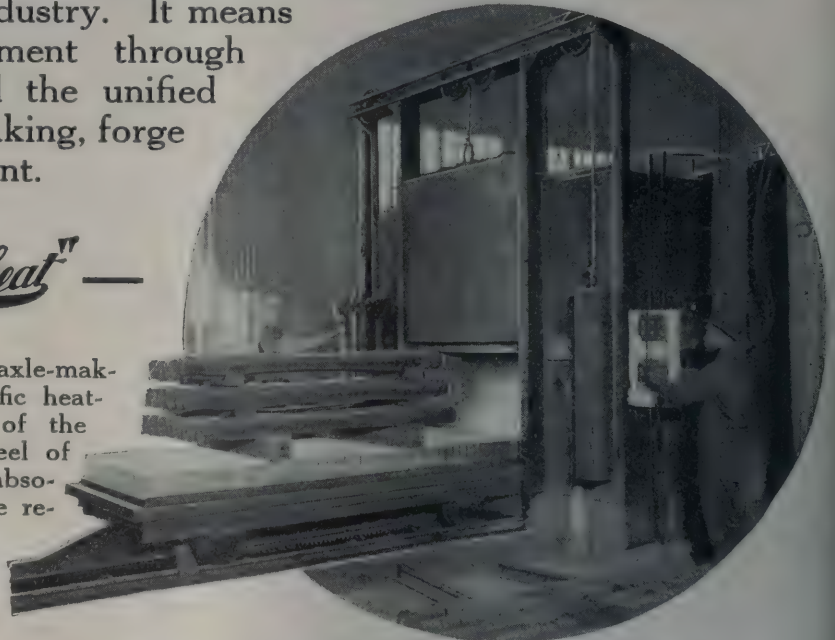
GOOD NEWS FOR USERS OF "Electroheat" AXLES!

THROUGH a consolidation of the resources, plants and products of the Valley Steel Company with those of the Laclede Steel Company, St. Louis, Mo., greater things are in store for users of "Electroheat" Car Axles.

The new organization makes possible the manufacture of "Electroheat" Axles from billets to finished product by our company—**by the company which in the past has supplied the steel for the manufacture of "Electroheat" Axles!** It brings to the electric railways the united efforts of the Laclede organization which has excelled in the manufacture of billets and other merchantable steel products, and the resources of the Valley Steel Company, pioneers in the manufacture of scientifically heat-treated axles. It means unaltered quality and bigger, better facilities for serving the industry. It means possible greater development through wider research work and the unified co-operation of the steel-making, forge and heat-treating department.

The Word "*Electroheat*" —

stands for a distinct achievement in axle-making. It marks a process of scientific heat-treatment through the utilization of the Electric-Furnace which insures a steel of proper **strength** and **toughness** and absolute manufacturing **uniformity!** The result is a steel structure possessing high resistance to breakage, bending or other service stresses.



A charge of "Electroheat" Car Axles entering the Electric Furnace for heat-treatment

LACLEDE STEEL COMPANY
ST. LOUIS, MO., U. S. A.

Sales Representatives

NEW YORK—National Railway Appliance Company
CHICAGO—H. F. Keegan
ST. LOUIS—Grayson Railway Supply Company

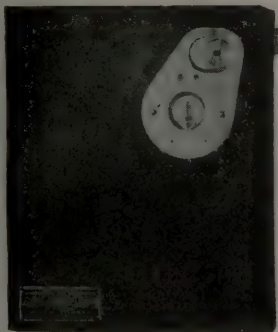
ST. PAUL—Rank & Goodell
LOS ANGELES—S. I. Wailes
SALT LAKE CITY—Ambler, Ott & Riter Company

SAN FRANCISCO—F. F. Bodler
PORTLAND, ORE.—W. F. McKenney
TORONTO, CAN.—Railway & Power Eng. Corp., Ltd.

**The Motorman
and Conductor
of this Car are
members of the
UNITED STATES
FUEL
ADMINISTRATION
and they are Pledged
to save Electricity
which means
COAL**



**War Board American
Electric Railroad Association**



Make
this Pledge
effective
immediately
and
effective
permanently
by
installing
the
Rico
**Coasting
Recorder**
which
embodies

**The True Principle for Measuring
Operating Efficiency**

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK



When you order Supply Parts

remember that G-E renewal parts are built every bit as good as the originals. They are made from the same materials and by the same expert workmen and will, therefore, be more suitable than supply parts made by others.

Look to G-E for your motor repair parts.

General Electric Company

Atlanta, Ga.
Baltimore, Md.
Birmingham, Ala.
Boston, Mass.
Buffalo, N. Y.
Butte, Mont.
Charleston, W. Va.
Charlotte, N. C.
Chattanooga, Tenn.
Chicago, Ill.
Cincinnati, Ohio
Cleveland, Ohio

Columbus, Ohio
*Dallas, Texas
Dayton, Ohio
Denver, Colo.
†Detroit, Mich.
Des Moines, Iowa
Duluth, Minn.
Elmira, N. Y.
Erie, Pa.
*El Paso, Texas
Fort Wayne, Ind.
Hartford, Conn.

General Office: Schenectady, N. Y.

ADDRESS NEAREST CITY

*Houston, Texas
Indianapolis, Ind.
Jacksonville, Fla.
Joplin, Mo.
Kansas City, Mo.
Knoxville, Tenn.



Los Angeles, Cal.
Louisville, Ky.
Memphis, Tenn.
Milwaukee, Wis.
Minneapolis, Minn.
Nashville, Tenn.

New Haven, Conn.
New Orleans, La.
New York, N. Y.
Niagara Falls, N. Y.
*Oklahoma City, Okla.
Omaha, Neb.
Philadelphia, Pa.
Pittsburgh, Pa.
Portland, Ore.
Providence, R. I.
Richmond, Va.
Rochester, N. Y.

St. Louis, Mo.
Salt Lake City, Utah
San Francisco, Cal.
Schenectady, N. Y.
Seattle, Wash.
Spokane, Wash.
Springfield, Mass.
Syracuse, N. Y.
Toledo, Ohio
Washington, D. C.
Youngstown, Ohio.

*Southwest General Electric Company. †General Electric Company of Michigan.
For CANADIAN BUSINESS refer to Canadian General Electric Company, Ltd., Toronto, Ont.

GENERAL FOREIGN SALES OFFICES, Schenectady, N. Y.; 30 Church St., New York City; 83 Cannon St., London, E. C., England. 7528

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, January 12, 1918

Number 2

The Zone System Deserves a Fair Trial

THE zone system of fares proposed by the Massachusetts Public Service Commission for the Holyoke Street Railway, although novel in a number of its features, is not a revolutionary move in urban transportation. Other urban zone systems exist in this country, and the plan is growing in popularity for suburban and interurban service, one particularly successful application being that on the Shore Line Electric Railway, as described in this issue. The authorization of

such a system for Holyoke has a peculiar significance at this time, when the question of the best method of increasing fares is so acute, and the comments of the Massachusetts Public Service Commission in approving the company's preference should be carefully noted. This body does not find the results of 6-cent fares in Massachusetts especially encouraging, and it is impressed with the possible usefulness of a zone system with a central 5-cent area for some localities. Finding Holyoke a proper subject, it applies such a remedy, without binding itself to the same treatment for future patients. Its attitude is summed up in words which amount substantially to these: "This treatment should have a fair trial." With this we agree most heartily. Without casting any aspersions upon companies that are experimenting with 6-cent fares

—nor do we think the commission intended so to do—we feel that it is to the interests of the industry that the zone system of charging be tried more widely, in spite of any difficult study necessary, in order to establish the conditions of successful operation. The railways have much to learn about rate-making, but a one-sided experimentation might only injure them. Perhaps all the different methods of increasing revenues will prove their usefulness under varying conditions. In any case prompt and thorough trials are needed for future guidance. The industry should take the lead in this matter, at least as far as it can, and not leave the initiative to the commissions.

Line Losses Are Not All in the Wires

IN TRANSMISSION lines operating at very high voltages, 60,000 or higher, losses over the insulators and through the atmosphere assume formidable proportions. These losses, or rather the costs of mitigating them, form a considerable factor in limiting the voltage. Anyone who has observed a high-voltage line on a dark night has noted the blue corona around the insulators and possibly on the wires also. This represents power loss, the air being heated thereby. At high

altitudes the loss is very serious, due to the rarefaction of the air, which loses its insulating properties at low pressure. The so-called vacuum tube illustrates this phenomenon, for such a tube contains air or other gas at a pressure of a few millimeters of mercury, and is a fair conductor. A true vacuum is, of course, a perfect insulator. Data on the subject of line losses are fairly plentiful but accessible mainly to the specialist because embedded in technical language. In this issue is an article by Professor D. D. Ewing giving in more popular style the results of some studies conducted on an electric railway line in the Middle West. To make his article complete he has had to use some geometrical diagrams which will naturally appeal only to electrical engineers, but aside from these there is much of general value and interest in the article. With

the comparatively low voltage of 33,000 used on the line tested the leakage losses are not serious, but the results clearly illustrate the principles involved. Owing to the fact that the routine of electric railway operation leaves little time for research work except that directly necessitated by the exigencies of the hour, we must depend upon outsiders to obtain data like those given in the present article. The technical departments of universities located near railway lines are well equipped to make necessary tests; all that is needed is that the railway men formulate their research problems and submit them to the college laboratories for solution.

The First Condition of Peace

DID you notice particularly the first item in President Wilson's most admirable summary of the Allied peace aims? "Open covenants of peace, openly arrived at" . . . "No private international understandings" . . . "Diplomacy always frank and in the public view"—why, that is simply free and frank PUBLICITY!

President Wilson knows what publicity in diplomacy will prevent, and what it will accomplish. The powers of darkness cannot avail in the full light of day. The public gives its support only to what it understands. Hence our leader places publicity as the cornerstone for the beautiful edifice of a world made safe for democracy.

This has a meaning to those in public utility service as well. The age is one of publicity. When the last stronghold of secrecy and intrigue in the Old World is falling, there is no place for it in the New.

Does it seem trite to urge publicity after so much ink has been used on this subject? Not when the following can occur:

Installation of a higher fare without a word of explanation to the public.

Adoption of a new fare-collection system, leaving the rider to guess where he gets on or off (to speak literally).

Wake up—the world has moved, and this is the day when the public must know.

Don't Let Them Forget About Daylight Saving

IN ALL the zeal of carrying on campaigns for higher fares and co-operating with the government in the various suggested ways for the conserving of fuel, it should not be forgotten that one desired innovation has not yet been effected—daylight saving. A bill to turn back the clock one hour during the warm months was passed by the Senate at the last session but was held up in the House. This matter should now be enacted into law. Daylight saving would be a boon to the nation's workers, and the inertia of conservatism, the only opponent, should be overcome. It may be quite proper not to be the first to cast the old aside, but it is just as fitting not to be the last by whom the new is tried. In daylight saving we have already lagged behind European nations too much. This is something the War Board would do well to keep before the authorities in Washington.

Standardization and Other Points Shown by the Car Statistics

THE table of car statistics published last week presents a number of interesting facts, besides giving a record of the total number of cars ordered or built during the year for electric railway purposes. One of these facts is very gratifying as indicating a real approach toward that standardization of car design which has been the ideal for so many years.

Last year was the first in the history of electric railroading when scores of cities bought exactly the same car, in this case the Birney safety type. This fact at least disposes of the contention that "local conditions" have a controlling influence in determining the exact length, to the fraction of an inch, of a car which can be operated on the streets of any particular city. But if railways have been able to standardize on safety cars, there does not seem to be any particular reason why they should not be able to standardize also on cars of greater length, at least to the extent of not requiring the car builder to get out an entirely new set of drawings so that a car may be a few inches longer, or shorter, than the one he has just built.

On questions of the style of car there may be greater differences of opinion, but even here local conditions, we believe, if analyzed carefully, will not infrequently be found to be "local prejudices." Incidentally, among the larger cars ordered in 1917, there was an evident tendency to use the Peter Witt pay-as-you-pass car, although we do not think that the chief benefits to be derived from car standardization necessarily require the same arrangement of interior or fare payment system on all cars affected. These are details compared with features which concern the construction of the car body.

The table of car statistics also discloses the fact that, although the car builders were far from busy during the year, an unusually large number of railways built their own cars. This condition could not have been brought about in all cases by the desire to reduce the cost of transportation from factory to railway, because in some cases the railway was located in the same town as a large car builder.

In all, five electric railway companies reported hav-

ing built during the year forty or more passenger cars each. There were also twenty companies reporting as building from one to five cars, although most of these home-built cars were service or freight cars.

Where a company attempts to build anything so elaborate as a passenger car, in our opinion it is very doubtful if any money is saved thereby. Work of this kind is sometimes planned because a company hopes thereby to keep in employment some of its repair men when work of other kinds at the shops is scarce. But even under such circumstances there is a tendency to disregard the overhead costs of the car building as well as to overbuild new shops to take care of this work.

Both Discouragement and Encouragement in the Statistics of the Year

THE statistics for 1917 on track, cars built or ordered, receiverships and foreclosures, published in the last issue of this paper, certainly do not reflect a very flourishing condition of the industry. Exclusive of electrified steam railroads and the new rapid transit lines in New York, the new electric railway track of the country reported is only about 300 miles, or less than three-quarters of 1 per cent of the total number at the beginning of the year.

An examination of the individual reports is probably even more illuminating. It shows that this new mileage is made up almost entirely of very short sections, evidently connections put in purely for operating convenience. Real extensions of lines are rare. Large industrial states, like Connecticut and Indiana, report less than 3 and 5 miles, each respectively, of new track built, while New York State during the year added only 11 miles of surface electric railway trackage.

The rolling stock table tells a like story. Briefly it is that the new rolling stock ordered during 1917 is the lowest recorded since 1907, when this paper began the compilation of its statistics. This means that 1917 had probably the lowest number of cars bought during any year since the general adoption of electricity.

The third table published last week, that of receiverships and foreclosures, was the only one of the three to show an increase.

There is no use blinking the facts. The industry is sore beset, and it would require more than a Pollyanna to become an optimist on the conditions shown by these tables. Nevertheless, there are encouraging signs, if the industry will only take heed and avail itself of them.

Of course, the principal basis for optimism and confidence in the electric railway industry is the essential nature of the service rendered. In spite of past competition of all kinds, the electric railway has remained and must remain the only means of local transportation which is available to the great majority of the people in any community. In other words, the electric railways must continue to run because the people cannot get along without them. Moreover, as the population of the country increases, the need for more and better local transportation will increase in an even greater ratio than the population. Hence the railways must not only continue to give service but must improve and extend that service as the needs of the community require.

Now, while there is nothing particularly new in this

truth, the fact remains that there is greater popular recognition of it than ever before. The attitude of the regulatory bodies as a whole is more sympathetic, as was shown during the past year by a greater willingness to grant fare increases as well as to help in other ways. The public also is understanding to a better degree the problems of the roads.

This is the proper time for the roads to take advantage of this condition. Let each explain to its public, if it has not already done so, why its cost of operation has risen and why higher fares are necessary. The public should also be told how it can help the companies in other ways to improve the car service. It is very important that the betterment of public relations should not lag just at the time when the greatest good can come from an intelligent application of its fundamental principles.

Organized Labor Should Not Profiteer

FAITH in the union-labor movement, which has been fostered during recent months under the sane leadership of President Gompers, is due for a setback in the public mind through such actions as the attempt to force wage increases on companies whose old contracts have not expired. In Cleveland and in Toledo efforts are being made to advance the interests of the employees through unfair pressure, notwithstanding the fact that written agreements as to wages and working conditions are still in force. Organized labor has been strong in its condemnation of war profiteering on the part of capital. A fair-minded public must put into the same classification such a movement on the part of trainmen who would take advantage of war conditions to promote their own welfare to the serious detriment of the utility which is affected.

Even in those cases where the wage scale fixed by agreement a year or two ago does not meet the present cost of living, labor leaders must remember that their employers have also to contend against the increased cost of materials and diminishing receipts. Voluntary raises in pay have been given by many companies to the extent that they can stand the extra burden. Other companies will have to take their chances with boards of arbitration when the present contracts expire. But to stir up public feeling by threats of strike or appeals to the federal government to compel a change in the agreement, is an act which should brand the agitators as poor sportsmen, and should not win for their appeal a popular indorsement.

Another view was taken in Chicago some months ago where unionism, under patriotic leadership, negotiated an agreement which showed a proper recognition of the exigencies of war times. In accepting a wage scale which was a compromise, the union employees bound themselves for a three-year period, and pledged themselves to do all they could to promote mutual interests, "keenly recognizing and appreciating the situation now confronting our government." This is the spirit which should govern all employees who are bound by contracts for a definite period. They should bury their cupidity and prejudices and bide their time. Better still, let their organization help to gain a flexible fare for their employers, and thus provide a basis which will meet fluctuating costs.

Rehabilitating the Power System

THE coal and labor shortage has forced into the limelight some unwelcome facts regarding power generation. Many power plants are using too much coal for their output. Even in peace times the older plants, many of them far from worn out, were being relegated to the scrap pile. The present conditions will hasten their progress in that direction.

A pound of good steam coal contains 12,000 B.t.u. more or less, that is, enough heat to raise 12,000 lb. of water 1 deg. Fahr. Converted entirely into electrical energy this would be almost exactly $3\frac{1}{2}$ kw-hr. In other words, *except for conversion losses a kilowatt-hour of energy could be produced from less than a third of a pound of good coal!* Some plants consume fifteen times, and the best of them burn nearly five times, this amount.

Unfortunately, unless new methods of transforming the chemical energy of coal into mechanical energy are discovered we must put up with a loss of at least 75 per cent in the chimney, the boiler, the engine or turbine, the condenser, the piping, the generator and the auxiliaries.

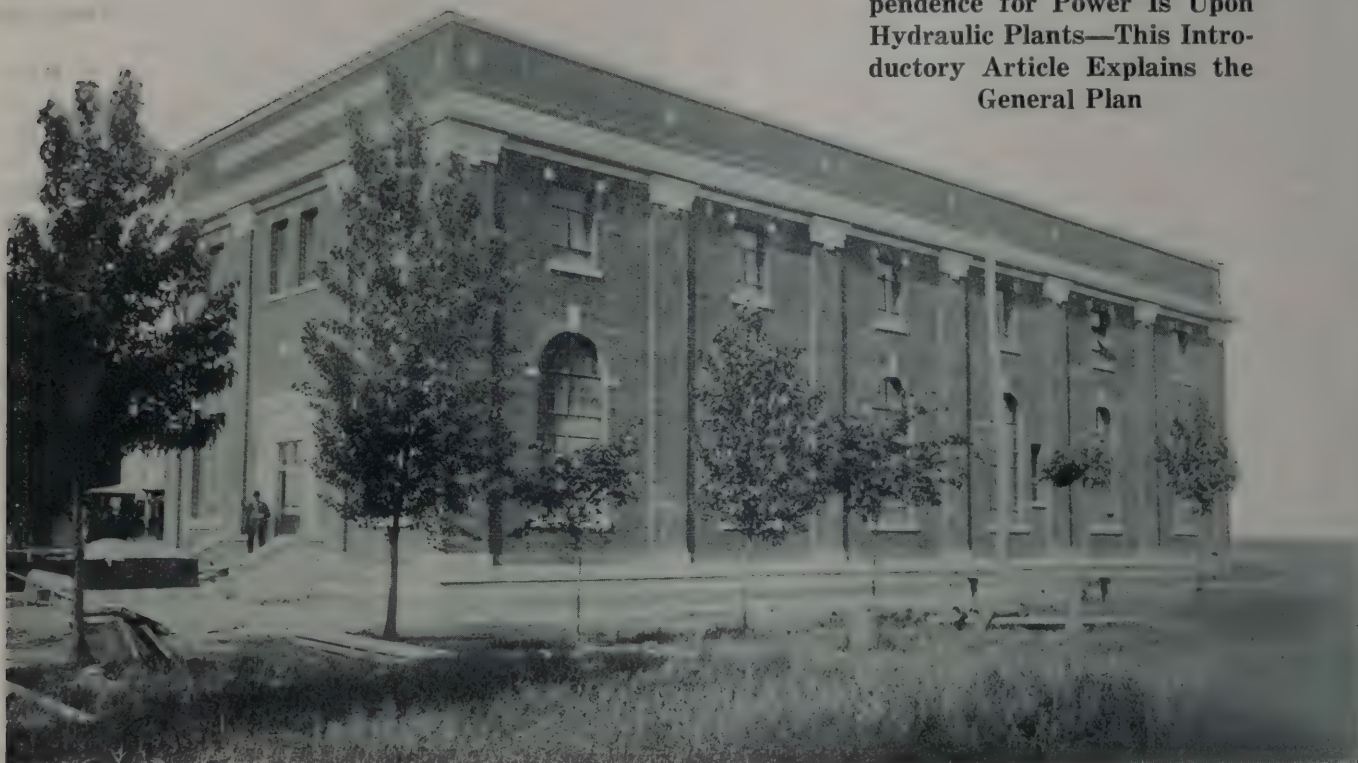
The situation outlined above explains the general rehabilitation of power plants, substations and transmission lines which is general in this country, Canada and elsewhere. These pages have contained many examples of the process.

This week we begin a series of three articles on the very interesting and typical work which is going on in Montreal, and which is as nearly completed as such a mutable thing as a power system can ever be said to be. In studying this account the reader must remember that it is a remodeling that is pictured, not the building of a new system from the ground up. Hence existing equipment has been repaired where it is cheaper to keep it than to throw it out. Of two steam plants still retained, one will seldom be used except as a substation. The other will be operated only on peak loads and as an emergency reserve. The surrounding abundant water power will be used to the limit as it should be. The redesign of the main steam plant, however, has received scrupulous attention, so that when it is running it will give the best possible account of itself. The distributing lines and substations are also being brought strictly up to date.

A feature of this remodeling at Montreal which illustrates the importance of standardization is the provision for shifting substation equipment from one part of the distribution system to another as needed. A company may have a transformer and converting equipment of aggregate capacity sufficient for its needs, but if this is not properly distributed there will be overloading at some points and underloading at others. One condition involves excessive energy loss, deterioration of apparatus and poor voltage regulation; the other is accompanied by operating inefficiency. Ability to move a unit as required will obviate this unbalancing. It might be argued that power needs can be anticipated if the growth characteristics of a community are properly understood, but the fallacy of this argument is proved by experience. It is best to be prepared for the unexpected. Mobility of equipment can well be considered as a factor of such preparation.

Electric Railway Power at Montreal

Montreal Tramways Is Completing Program of Power Generation and Distribution Rehabilitation—Principal Dependence for Power Is Upon Hydraulic Plants—This Introductory Article Explains the General Plan



FRONT AND EAST SIDES OF POINTE AUX TREMBLES SUBSTATION,
MONTREAL TRAMWAYS

THE power generation and distribution system of the Montreal (Quebec) Tramways is unusually worthy of study at this time because a train of circumstances has brought about a fairly complete remodeling of the main power plants, the substation layout and the transmission and distribution lines. Ever since the three original electric railway lines in the city were developed, about 1892, there has been a struggle to keep the power supply abreast of the expansion of the railway system, which has coincided with that of the city. In recent years the growth of the city has been very rapid until now the population is in the neighborhood of 800,000. In addition to the city itself the Tramways supplies transportation to Westmount, Outremont, Verdun, Maisonneuve and Mount Royal, which form an integral part of the community. The Tramways now has more than 260 miles of track and more than 1000 cars in service.

The principal source of power for the Tramways has been the water power, in which the neighborhood abounds. Upward of 500,000 hp. is developed within easy reach of Montreal, so that steam power is required by the Tramways only for reserve and to control the peaks of the load, thus limiting the service charge for power. Two steam plants are in operation, the old William Street station, now used practically entirely as a substation, and the more modern Hochelaga plant, which is the principal steam reserve. The Hochelaga plant is in course of remodeling, the details of which process will be covered in a later article.

Power from the hydraulic plants is transformed in several substations containing motor-generator sets. One of these, the St. Denis substation, has been entirely remodeled this year, and a new substation at Pointe aux Trembles is now receiving the finishing touches. One motor-generator set is in operation here and a second is about ready to be started up. In the early days, before the local hydraulic development had progressed very far, steam power was depended upon very largely for the Tramways' supply, but for nearly twenty years an increasing proportion of water power has been utilized. Of late years the tendency seems to have been to keep the steam power about 20 per cent of the total, and generating equipment has been added from time to time to maintain this average.

FACTS PRECEDENT TO PRESENT POWER SITUATION

Going back to the year 1900 we find that the first contract for water power was with the Montreal Light, Heat & Power Company for 5000 hp. delivered at the William Street power house. By this time the Tramways was approaching the limit of the steam capacity, the output being about 13,000 hp., as compared with a possible output of 17,000 hp.

In an article published in the STREET RAILWAY JOURNAL for June 6, 1903, page 833, Ralph D. Mershon, consulting engineer to the company, described the equipment which had been installed to receive and transform the hydraulically produced power, the equipment being for the time rather unique. The power was received

in the form of quarter-phase current at 66 cycles and 2200 volts over seven circuits. Six induction motor-generator sets and one synchronous motor-generator set were installed, of a combined rating of 5000 hp. continuous output, and a relay capacity of 15 per cent more than this. When installed these sets, which are still in operation, were said to be among the largest built up to that time, although individually not the largest. The total capacity, however, was probably larger than that of any group of induction motors in the world assembled under one roof.

One of the most novel features of the installation was provision for pumping power back into the line when needed, using the direct-current machine as a motor and the induction machine as a generator. This was probably the first commercial use of the induction generator, although the regenerating ability of the induction machine when supplied with polyphase exciting current was known long before.

In choosing motor-generator sets rather than rotary converters for the William Street substation the engineers had the following considerations in mind: First it was desirable to have machines that could be operated with the minimum of care, attention and skill. The induction motor had been highly developed and the rotary converter had not by any means attained the perfection which has since been achieved. In the second place it was desired to interfere as little as possible with operating conditions on the power company's transmission system, and it was felt that induction motors, brought up to speed from the direct-current end of the sets, would meet the requirements in this particular. Moreover, started in this way, the motors could be built with practically no resistance in the squirrel-cage secondaries and hence with excellent speed-regulating qualities.

The next increase in power supply came about through a contract made with the Shawinigan Water & Power Company for 3000 hp. delivered at a local substation of the Shawinigan Company. This is in the Hochelaga

ward of the city, a section in which the demand for power was rapidly increasing. Also at this time a contract was made with the Montreal Light, Heat & Power Company for 4000 hp., and to utilize this power two 1000-hp. motor-generator substations were built, one on Glen Avenue near St. James Street, opposite the St. Henry carhouses, and the second on Bellechasse Street, west of St. Denis Street. The railway company spent about \$500,000 on this expansion. The contract still stands with respect to power furnished through the St. Henry and St. Denis substations, the latter of which has just been entirely rebuilt, and the last 2000 hp. taken from the Montreal Light, Heat & Power Company on above contract.

At present 12,000 hp. of hydraulic power is being taken under the Montreal Light, Heat & Power Company and Shawinigan Water & Power Company contracts. This is purchased at the rate of \$25 per horsepower-year for the hydraulic power, with \$4 for conversion on the 3000 hp. taken from Shawinigan only. The rate is based on a 70 per cent load factor.

Soon after the provision for distributing Shawinigan power in the eastern section of the city had been completed, the company felt the need for a steam reserve in this section, and in 1906 a standby station along then-approved lines was built. This contained two 1000-kw. and one 2000-kw. marine type compound McIntosh & Seymour engines driving direct-current generators. A few years later this equipment was supplemented with a 2000-kw. alternating-current turbo-generator unit with a large rotary converter. This was put in as a temporary expedient to provide greatly needed additional reserve, and the equipment was selected because it provided a more economical generating unit than the older machines. The turbine, the rotary and the engines are still in use. The station as a whole, however, is being entirely remodeled.

A new source of water power was utilized in 1912 when the Tramways company began to buy hydraulic power through the Montreal Public Service Corpora-



SKETCH MAP OF MONTREAL, QUEBEC, SHOWING LOCATION OF ELECTRIC RAILWAY LINES, POWER PLANTS AND SUBSTATIONS

tion, additional substations being installed from time to time. The corporation is the distributing company for the Canadian Light & Power Company. The latter is a subsidiary of the Montreal Tramways & Power Company, of which the Tramways company is also a subsidiary.

The corporation furnishes power on a meter basis in three-phase form at 13,200 volts to a total of 10,000 hp. Of this 4000 hp. is delivered at the old William Street plant, where two 1500-kw. synchronous motor-generator sets serve to convert it into direct-current form.

THE 1916-1917 REHABILITATION

With this outline of the development of the power situation in Montreal in mind it is possible to appreciate the circumstances leading up to the present rehabilitation. It has been seen that the company made



SOUTHEAST VIEW OF ST. DENIS SUBSTATION,
MONTREAL TRAMWAYS

large extent to which power is purchased it is evident that a very considerable saving would be brought about by tying the whole system together. This saving, capitalized, would provide for a very considerable investment in underground cables and still leave a margin of profit. A further saving was possible through the use of more centralized energy generation operated according to modern scientific methods.

As a logical part of the development it became necessary to introduce large alternating-current generating units in place of the direct current units in use. By means of the interconnected system the power generated by these units would then be available at any point when needed to supplement the hydraulic power.

IMPROVEMENTS AT HOCHELAGA

In improving its power generating facilities the company naturally selected the Hochelaga power plant as the logical one for improvement because it is located conveniently with respect to water and to land for the storage of coal. In looking to the future it was considered desirable to plan for the possible ultimate installation of four turbo-generator units of 15,630-kva. capacity each. One of these has been installed and a second is on order for delivery in April, 1918. The completion of the plans will involve the abandoning of the three vertical units and the 2000-hp. steam turbine now in place. However, two turbines will take care of the requirements for some time to come and the vertical units will be retained for the time being.

The installation of the turbine units made an increase in boiler capacity necessary, and four 1100-hp. B. & W. marine type boilers, with superheaters and

arrangements for power supply in different sections of the city to the best possible advantage for the time being, but with a growing need for a unification of the whole system, last year the Tramways company began the execution of a comprehensive plan for the purpose.

The decision to overhaul the distribution system at this time was brought about by a number of causes. In the first place on account of the limited number of distribution points it was difficult to distribute power at the low direct-current voltage of 600 without excessive loss. In connection with this was the insecurity of the power supply at any point, as it was difficult for one part of the system to help out another.

Another factor in the matter was the necessity for putting the feeders and transmission line underground. This was not only in accord with the trend of the times in large cities, but the movement was accelerated by act of legislature. Obviously in placing the circuits underground it would be most economical to use high voltage wherever possible.

It was therefore decided first to increase the number of distribution points by adding substations; second, to install a comprehensive high-voltage alternating-current transmission system, and third, to interconnect the substations so that power will be available at any part of the system.

Investigation showed that the instantaneous power demand as a whole on all of the power houses and substations of the company, prior to the amplification of the system, was less than 80 per cent of the sum of the individual instantaneous demands. In view of the



SOUTHEAST VIEW OF HOCHELAGA REMODELED POWER HOUSE,
MONTREAL TRAMWAYS

economizers, were added. These were provided with ejector draft fans, motor-driven. The boiler house was further modernized by the addition of such devices as steam flow meters and draft gages, by the elaboration of the coal-handling system, etc. Under way also are changes in the old boiler furnaces for the purpose of increasing the boiler outputs. Taylor stokers with independent draft fans will replace the chain grates previously used.

Even more important than the changes in the power plant have been those in substations and the distributing system. The St. Denis substation has been revamped at a cost of nearly \$225,000, and a beautiful substation has been built at Pointe aux Trembles. The latter is designed as a model for future development,

Effects of War Conditions on Cost and Quality of Public Utility Service

Extra Operating Expense of \$116,500,000 per Year Should Be Considered by Commissions in Modifying Rates for Electric Service

THE effects of war conditions on public utilities are explained in considerable detail in a paper by Lynn S. Goodman and William B. Jackson presented before the American Institute of Electrical Engineers at New York on Jan. 11. This paper deals particularly with the effects upon electric light and power business, but the same general principles are also applicable to electric railway service. These effects are placed under two general heads, namely, those manifest in the heavy increases in operating cost and those causing the extraordinary increases in cost for new plant required to care for added business.

During the past years individual salaries and wages have been gradually increasing, while the labor cost per unit of service has been decreasing. War conditions, however, have greatly affected this situation, and the growing scarcity of labor in the ordinary occupations of peace tends to increase wage and salary scales. Employment of women has placed an additional class of labor at the service of the electric utilities, but more women employees are required than the number of men replaced, and war conditions tend to exhaust even this class of labor by offering wider fields of employment.

An analysis of the United States Census statistics shows that the increase in the average wages per employee, not including general officers, managers and superintendents, during the ten years from 1902 to 1912 was 11 per cent. Since the beginning of the war salaries of officers, managers and general superintendents have not greatly increased, but the wages in the oper-

ating departments have increased from 15 to 50 per cent, and it is estimated that 25 per cent may be taken as the average increase thus far occasioned by the war. The total salaries and wages paid to employees of electric companies throughout the United States make up about one-third of the total operating expense. With normal growth from 1912, at the rate indicated by the growth during the previous ten years, the salary and wage disbursements of electric companies for the year 1917 would have amounted to \$90,000,000, of which one-seventh would have been for general officers, managers and superintendents' salaries and six-sevenths for wages. The increase in wages of 25 per cent, therefore, means an outlay on the part of electric companies of \$19,000,000 for the year.

INCREASE IN THE COST OF FUEL

Estimates based upon the United States Census reports show that the cost of fuel has an extremely important bearing upon the total cost of electric service. This item of expense for all the electric companies in the United States would have reached \$50,000,000 for the year 1917 under normal conditions and would have amounted to about 60 to 65 per cent of the normal generating expense. On the average, the cost per ton of coal to electric companies has increased a little more than 100 per cent on account of war conditions, making the increase of total cost due to the increased price per ton of fuel \$50,000,000. A conservative figure for the increase in tonnage due to lower quality and non-uniformity of grade is estimated at 10 per cent, which means an added increase of \$10,000,000, making the total increase \$60,000,000.

The output which might have been expected for 1917 under normal conditions for steam-driven electric stations is 13,000,000 kw.-hr., and an average requirement of 3 lb. of coal per kilowatt-hour of output shows that the fuel requirements would amount to not more than 20,000,000 net tons. This is approximately 3 per cent of the estimated output from the mines for 1917. Thus a relatively large reserve supply of coal in the hands of every electric company would tie up but a very small part of the coal supply of the country and this supply would be widely distributed over the country, and to a certain extent would be in proportion to the population and industrial importance of the several sections of the country.

The normal cost of materials and supplies other than fuel used in operation and current maintenance of electric properties makes up probably a little more than 15 per cent of the total annual operating expense. The increase in the cost of such materials and supplies due to war conditions have been as much as 75 per cent. Such an increase in this expense means an increase in expenditures in the neighborhood of \$30,000,000 over normal expense for 1917.

(Concluded from Page 74)

both with respect to architectural arrangement and machinery and control layout. In a large part of the territory the high-tension lines have been put underground in the company's own conduits in accordance with a standard plan. The low-tension cables are being drawn into the municipal conduits. The substations will be made the subject of a separate article, but their general appearance is shown in the accompanying photographs. All of the substations are being tied in with the Hochelaga power plant on a ring system, so that the reserve steam power can be promptly supplied at any point where it may be needed.

In the substations the plan is to use larger units than formerly, eventually practically standardizing on 1500 or 2000 kw. as the size. Previous to 1912 the tendency was toward units of about 500 kw. In remodeling the buildings the engineers have given special attention to improvements in lighting and ventilating conditions, with a result that delightful surroundings are provided. By the use of fireproof construction everywhere the fire insurance premiums have been reduced to a minimum.

Measures which include the development and maintenance of protective structures and lighting systems, as well as special policing, must be taken to protect properties from interference by enemy agents. The government action in restricting the activities of the alien enemy population is an important safeguard, but the necessity for direct protective measures adds hundreds of thousands of dollars to the normal expense account of individual large electric corporations and amounts to at least \$2,000,000 or \$3,000,000 in the total cost of service throughout the country.

INCREASE FROM TAX ON NET INCOME

According to the United States Census returns, the 1917 taxes paid by electric companies might normally have reached \$25,000,000. The proportion of gross revenue required for taxes has been increasing year by year, having been slightly more than 3 per cent in 1902, a little more than 3½ per cent in 1907 and nearly 4½ per cent in 1912. Taxes on net income made up a very small proportion of the total tax in former years, but this form of income taxation has had growing favor in legislative circles. An estimate of the amount of the expense which may be expected to be added to the cost of electric service throughout the country by the operation of the net income tax law will lie between \$5,000,000 and \$10,000,000 for the year 1917.

The extra expense now imposed on electric companies on account of war conditions, as shown by the foregoing amounts, equals the immense aggregate of \$116,500,000 per year. This is a quarter of the normal estimated gross revenue for 1917 of all the electric companies, and it wipes out two-thirds of the sum that would have been available for return and surplus.

In addition to the above expenses there are the additional expenses caused by the difficulty of retaining trained operators, the cost of protecting properties against malicious interference and the possible decrease of consumption of electric power, the magnitude of which it is impossible to estimate.

EXTRAORDINARY INCREASE IN COST OF NEW PLANT

The effect of war conditions in the matter of extraordinary increases of cost for new plant required to care for added business appears in several forms. The increased cost of new plant per unit of capacity manifestly affects the cost of service not only for the period of the war, but for the life of such plant. Many electric companies are now confronted with the necessity of caring for large demands for power arising from the increasing expansion in the manufacture of material for war purposes.

The economical power generating station is the proper medium for the supply of large power requirements arising on account of the war. The purchase of power leaves the manufacturers of munitions and other war materials free to devote their energy to the development and operation of the manufacturing plants without diverting any of their energy to the development of power plants or their operation. These advantages are so great that it is advisable that the government should use every reasonable means to encourage the power companies.

Extension of the totals shown in the United States Census of central stations for past years to the year

1917 show that under normal growth the total revenues in 1917 would have reached \$475,000,000 and the operating expenses \$290,000,000, making a total income of \$185,000,000. Estimating the cost of construction and equipment at \$3,500,000,000, the income would represent 5.3 per cent of this cost of construction and equipment. If no other factors entered into the problem besides increases in cost of operation, the fuel expense would have increased \$60,000,000 for 1917, other supplies \$30,000,000, labor expense \$19,000,000 and taxes \$7,500,000, representing an aggregate increase of operating expenses for these items of \$116,500,000. This is an increase of 40 per cent in operating expenses, and it reduces the divisible income to \$68,500,000, which amount is equivalent to less than 2 per cent on the cost of construction and equipment.

Current expense accounts may be reduced by postponement of planned repairs which would normally be made at once, but it is well to recognize that the longer repairs are put off the more they cost. While current expenses may for a time be lower, the cost in the long run will doubtless be increased. The net results of such economies might amount to as much as 10 to 15 per cent of the normal operating revenue of the electric companies, but they are offset by increases in expense which have not been included in the amounts named, such as expenses for obtaining new employees, the lowered efficiency of such employees, special policing, etc.

DECREASE IN CONSUMPTION OF ELECTRIC POWER

Principal consideration has been given to the effect of war conditions as increasing the demands for service. In England the danger from air raids and the necessity for conserving coal have materially decreased, and in some cases almost wiped out, the street lighting service furnished by many companies, and the domestic and commercial lighting loads have been very materially reduced. There has, however, been quite a universal increase in rates, in some cases flat percentage increases of the same amount for light and power, in other cases differing percentage increases for light and power, and in still others increases depending upon changes in cost of fuel. The flat percentage increases have varied from less than 10 per cent to as high as 50 per cent over the rates in effect prior to the war, London rates having been increased 50 per cent.

From the foregoing it is evident that increased expense for service arises in every department of the business, in operating labor and supplies and taxes, in protection of the property, and in cost for extensions of plant. The latter is affected not only by abnormal first cost for equipment and its installation, but also by the present difficulty in obtaining money for such purposes at other than exorbitant rates as compared with normal. The increases of cost of electric service on account of war conditions are so great that rates for service which were equitable at the beginning of the war are in some cases now not covering the operating expense. Where companies are being loaded with war business, the new business in many cases may become a serious menace to the company, which can only be overcome by taking into account the war conditions in determining the rates to be charged. It seems proper that regulatory bodies should take into account these considerations in their requirements for electric service during the war.

Zone System Approved for Holyoke Company

Massachusetts Commission Decides That Zone System with Central Five-Cent Area Is Best Suited to Local Situation—Decision Not a Binding Precedent for Other Cases, but Commission Says Such Zone Plan Should Have Fair Trial—Experience with Six-Cent Fare on City Lines Not Especially Encouraging So Far

THE so-called zone system which permits city electric railways to raise their fares without increasing the 5-cent rate in the central district should receive a fair trial—this is the point of the fare decision just made by the Massachusetts Public Service Commission in the Holyoke Street Railway case. Without establishing any precedent which must be followed in other cases, the commission holds that such a zone system is well adapted to the Holyoke situation and is likely to produce the most satisfactory results for all concerned. In its opinion, the experience thus far in Massachusetts with a 6-cent unit of fare for city lines has not been especially encouraging.

The Holyoke Street Railway had asked the commission to select the method, from among several suggested, by which the road could obtain more revenue. No new schedule of rates was filed, but it was proposed to establish a zone system, increase rates, or do both. The commission's decision now authorizes the general zone plan proposed by the company, with a few modifications in details. Complete relief, it is said, should not be expected in these war times.

According to evidence submitted to the commission, the company operates about 72 miles of track, the lines in general radiating from the City Hall in Holyoke to Springfield, Northampton and other towns. The population of the territory served increased from 60,374 in 1890 to 104,296 in 1915. Between Springfield, Holyoke and Northampton the company is in competition with the Boston & Maine Railroad, upon which fares at lower than the normal rate are charged because of the competition. The permanent investment per mile of main track in 1916 was \$44,914.

The old fare unit was 5 cents, except on the Amherst and Sunderland division, where it was 6 cents. No workmen's or other reduced rate tickets were sold except the legally required half-fare tickets for school children. Few changes in fares had been made since the beginning of electric operation. The distance which

might be traveled for 5 cents was comparatively long in certain cases, ranging from 7.26 to 10.06 miles in twelve instances. Possible rides of more than 6 miles were frequent.

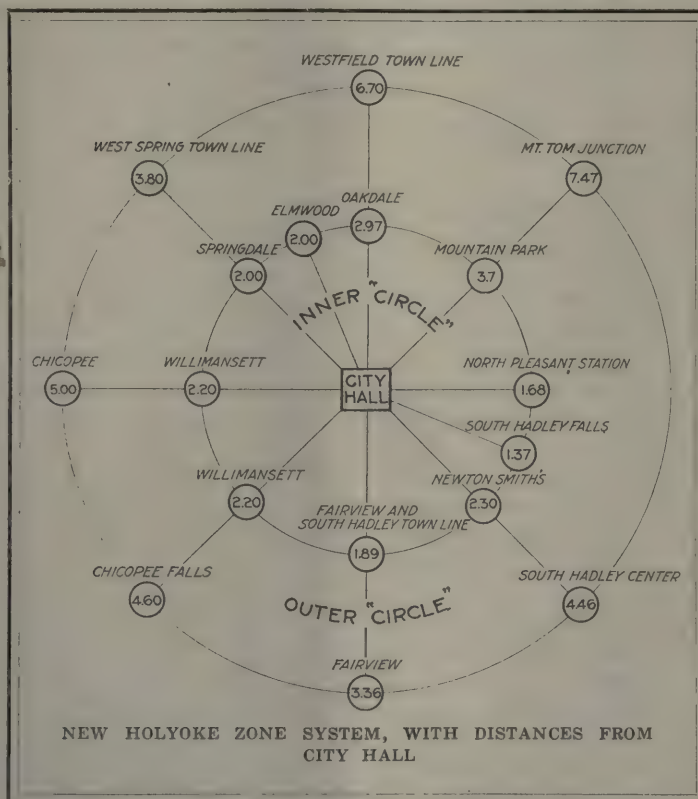
Until recently, the road had been one of the best paying in Massachusetts. From 1892 to 1915 it paid regular dividends of 8 per cent. In the fiscal year 1916 it paid 6 per cent, and in the succeeding year, 4½ per cent. In all but five years these dividends appear to have been fully earned, and only slight drafts upon surplus were made. Since much of the stock was issued at a premium, the actual return was less than the rate of dividend. From 1908 to 1917 inclusive the percentage earned on the investment ranged from 4.32 to 8.60; the investment from \$1,938,334 to \$2,953,017, and the income from \$119,719 to \$155,675. The total permanent assets on June 30, 1917, were \$3,051,478. The operating revenue in 1917 was \$711,374, and operating expenses \$537,170.

The inspection department of the commission found that the track and roadbed had been well maintained and are now in fair condition. During the next five years, it is estimated, about 20 miles of track should be relaid and about 95,000 ties renewed, at a total

cost of about \$244,000. In addition, about \$144,000 should be expended for renewals and repairs of special work, overhead system, telephones and signals.

The company has 139 passenger cars, average age fifteen years. Thirteen of the sixty-six closed cars are of the semi-convertible type. Eight were purchased in 1916, and five in 1913. None of the other cars are really modern. Many car replacements should be made in the near future. The single-truck cars have for the most part outlived their usefulness. In this matter the commission's finding says:

"It is desirable that the company should gradually abandon the larger part of its present equipment and substitute semi-convertible cars which can be used the year around. While the management feels that the



open cars attract traffic during the summer months, properly designed semi-convertible equipment is in some respects more attractive, and the present double equipment unquestionably adds materially to expense of operation. On certain lines one-man cars can probably be used to advantage."

Out of 384 motors, 186 are of good type and 130 are less efficient but still serviceable. The remainder, in the opinion of the inspection department of the commission, are unprofitable to operate and should be sold before junk values recede. In 1914 the company constructed, at a cost of about \$225,000, a modern car-house, shop and office building in Holyoke. The department reports it to be one of the best of its kind in the State. It has decreased maintenance, car storage and inspection costs. The department, however, believes that better results can be secured if the mileage per car per day is furnished to the master mechanic and inspections made on this basis. About \$250,000 was expended in power plant improvements in 1914, and the plant is now in good condition and reasonably efficient. The voltage throughout the system is reasonably good except on the Westfield line, where new feeders are needed. The company, it is said, has always been regarded as well managed and furnishing good service.

RIISING COSTS AND DEPRECIATION REQUIRE INCREASED EARNINGS

In support of its petition for increased revenue, the company held (1) that in the year ended June 30, 1917, it did not feel the full effect of prevailing high prices of coal, steel, copper and supplies in general, and these prices will materially increase the cost of operation for some time to come and, in conjunction with certain other factors, decrease net income; and (2) that the company did not in this year make sufficient provision for depreciation.

The coal now being used costs \$8.45 per ton delivered, and the increased price for 1918 consumption is expected to total \$21,500. Early in 1916 the company anticipated the rise in the material market and purchased a comparatively large stock. The management estimates that if current prices had been paid for materials used in repairs and renewals in 1917, the cost would have been about \$13,000 greater.

The commission feels that there is little reason to anticipate lower prices until some time after the war, and it says: "The company may reasonably expect in the immediate future, in our judgment, an increase in operating expenses, as compared with the year ended June 30, 1917, of at least \$35,000 per year and probably a greater sum, owing to increased prices of fuel and other supplies without allowing for any greater use."

Expert testimony was introduced by the company to prove that greater provision for depreciation should be made, the lives of the various classes of property being estimated as follows: Rolling stock and equipment, twenty years; track and electric line construction, sixteen and two-thirds years; buildings, thirty-three and one-third years; power plant and equipment, twenty-five years; park property, excluding land, twenty years. The composite life of all depreciable property was twenty-one and three-quarters years. From these life estimates the amount which ought to have been expended or set aside in 1916 was determined, the total

being \$144,501. The maintenance expenditures were then analyzed to ascertain the portion used for renewals which might properly have been charged against a depreciation reserve, and the unprovided-for depreciation was found to be about \$100,000.

The commission in its finding agrees that insufficient depreciation has been set aside, noting as an example the need of new cars to replace those which, while not worn out, are not efficient according to modern standards. Old power plants outside Holyoke have not been adequately charged off. No depreciation account exists to cover certain track and line renewals now overdue. The commission points out that while changes in the art may at any time upset life calculations, estimates must be made, for depreciation is certain and ought to be systematically provided for. It has been urged by certain experts that no depreciation reserve is necessary in the case of a large electric railway which has been gradually built up, since renewals tend to strike a yearly average if made regularly and seasonably. This, the commission concedes, may be true on a large system, but not on a property the size of that in Holyoke. In any case, life calculations are an important check upon yearly expenditures.

The commission is inclined to believe the property lives assigned by the company low, but it concludes that \$100,000 per year is needed to put the property into first-class shape within the next five years, besides at least \$35,000 per year, or probably double that amount, for increased operating expenses and at least \$50,000 per year for current depreciation. With necessary rehabilitation included, from \$185,000 to \$220,000 per year will be required.

MAXIMUM RETURN NOT TO BE EXPECTED IN WAR TIME

The commission is of the opinion that while the stockholders have already been called upon for a sacrifice of a reasonable return and ought, in justice, to be able to look forward to a day in the not remote future when dividends will be restored to the normal rate, they ought not to expect for the present a rate higher than 6 per cent. This would mean substantially less than 6 per cent on the entire investment. In determining what action is now just and reasonable, the commission gives weight to the following points:

1. The burden of high prices from which the company is suffering is caused by the war, which is falling with equal weight upon most individuals in the community. It is not a time when maximum returns ought reasonably to be expected.

2. Present prices of fuel and materials are clearly abnormal, and it ought not to be assumed that they will continue indefinitely. It is reasonable to suppose that relief will come soon after the war ends, and it is possible that it may come sooner through governmental regulation. So long as these excessive prices continue, it would be unwise to establish a scale of fares for the purpose of making a provision now for past and future depreciation which is theoretically sound but far in excess of any provision which this company and electric railways generally have been making in the past.

3. Under present abnormal conditions it is doubtful whether any extensive process of rehabilitation could be or ought to be undertaken. Even if funds could be obtained, the necessary construction materials and equipment could be secured, if at all, with great difficulty and only at excessive prices.

4. While the rehabilitation suggested is desirable, the property is in sufficiently good condition to furnish service of fair quality without it.

Under the conditions, therefore, it appears to the commission that it would be just at present to establish a new scale of fares estimated to produce about \$110,000 in additional yearly revenue. If this were obtained, though as a rule it is the experience of electric railways that the actual results from fare increases fall below previous estimates, it would enable the company, unless conditions change for the worse, to meet increased expenses, pay moderate dividends and make a substantial provision for depreciation.

"No one," says the finding, "can accurately foretell the results which may come from any advance in rates, and electric railway managers themselves are in doubt as to the best method of increasing revenue. Several methods are now on trial in the Commonwealth. The future course of prices, of wages and of traffic are just as uncertain, and it is also possible that new legislation during the year may modify the situation.

"Furthermore, an engineering and operating survey of the property is very desirable and ought to be made by the company. This should furnish full information as to the ages of all important items of existing property; renewals provided for in recent years from the maintenance account; economies likely to result from changes in rolling stock, track, line and shops; methods of track construction; use of power by motormen; routing of cars; layovers, and development of trolley freight and express service, in which last the company has made little progress."

METHODS PROPOSED FOR INCREASING REVENUES

Three methods of increasing fares were suggested by the company. Two were similar, based upon an application of the so-called "zone system." They preserved the 5-cent fare within the thickly-settled part of Holyoke, but reduced the distance which might be travelled, thus creating an outer zone to and from which an extra fare would be charged. The third method was based upon the substitution of a 6-cent fare and a 2-cent transfer charge for the present 5-cent fare. All three provided for a 7-cent fare on the Amherst and Sunderland division instead of the 6-cent rate existing at the present time.

Under the first zone plan the inner circle would include the thickly-settled portion of Holyoke and also the villages of South Hadley Falls and Willimansett. In no case would the limit of the inner circle be placed at a point within the congested territory unless the line terminated within that area. The zones and distances from the Holyoke City Hall are shown in the accompanying diagram. Under this plan it was proposed to charge 5 cents between all points within the inner circle and 5 cents between points in the outer circle located on the same line; 10 cents between any point in the inner circle and any point in the outer circle, and 15 cents between points in the outer circle located on different lines. Tickets would be sold at the rate of four for 30 cents, good between South Hadley Center, Fairview, Chicopee Street, Chicopee Falls or West Springfield town line and the Holyoke City Hall. A charge of 1 cent would be made for each transfer, but this penny would be redeemed if the transfer were presented within the indicated time limit. No transfers would be issued in connection with the 7½-cent tickets.

The second zone plan provided for the same inner and outer circles, but a somewhat different system of

charging. Instead of providing for the sale of 7½-cent tickets, good between the City Hall and the points above mentioned, it substituted a 7-cent cash fare, with transfer privileges at the City Hall, except that no transfers would be given from the South Hadley Center, Chicopee, Chicopee Falls or West Springfield routes to or from Mountain Park. In all cases, both for through routes and for rides within the inner circle, 1 cent would be charged for transfers, without redemption. Between Fairview and Chicopee Street, or Chicopee Falls, special tickets would be sold, making the fare 10 instead of 15 cents. The first zone plan was estimated to yield \$145,000 additional revenue a year; the second, \$132,000, and the 6-cent unit fare alone, \$140,000.

COMMISSION FAVORS ZONE SYSTEM FOR HOLYOKE

At the hearings the company expressed a preference for a zone system with a 5-cent unit in the thickly settled district. The communities in general favored a 6-cent unit without change in fare limits. In reaching a decision, however, the commission was guided by its best judgment as to the plan which, taken as a whole, would produce the best results for all concerned. It is difficult, the commission says, to gauge public sentiment accurately in advance of actual trial.

It is the commission's belief that experience so far in Massachusetts with a 6-cent unit on city lines has not been especially encouraging. It is an awkward fare, hard to collect, either with the old register system or with the prepayment fare box. In the latter case it lends itself readily to fraud. It has a further and perhaps more serious disadvantage in that it discourages short-haul riding and encourages jitney competition. There is, the commission states, an undercurrent of feeling in electric railway circles in favor of maintaining a maximum fare of 5 cents in compact metropolitan centers. Short-haul riding is the most profitable, and the best minds in the industry are now at work on the problem of attracting and holding this kind of traffic.

The point is well illustrated in the present case. In a city like Holyoke, where a number of lines radiate from a common center, the opportunities for securing short-haul traffic are at a maximum. For example, in the case of the lines which extend to Elmwood, North Pleasant Street and South Hadley Falls, none is more than 2 miles long, and in one case the distance is less than 1½ miles. A 6-cent fare on such lines would, in all probability, lead many present riders to walk and would thus open up an inviting field for jitney competition at the 5-cent rate. It is on such short city routes that jitney operations have proved most profitable. On the other hand, if a 5-cent fare can be preserved on such lines and a regular and a frequent service provided, present service being doubled by the introduction of one-man cars if necessary, opportunities for attracting traffic are great.

To the commission's mind there is equity also in keeping the 5-cent unit within the congested district, for it is this which gives strength to the system. Over two-thirds of the people served live in Holyoke and the adjacent settlements across the Connecticut River, and they have really furnished the prosperity which the company has enjoyed in the past. It has been urged on grounds of social welfare that the zone system ought not to be introduced, because it will further congest the central

district and prevent families from living in more comfortable surroundings in the suburban territory. Certain observers, however, are of the opinion that the benefit of a low fare in suburban territory is received by the landowner rather than by the tenant. In other words, where a low fare exists, land values and rents increase, while, if the fare is high, they remain at a low level. The net result, as far as the cost of maintaining a home is concerned, is much the same in either case, in the view of these observers, the difference being absorbed by real estate values.

ZONE SYSTEM WITH FIVE-CENT CENTRAL AREA SHOULD HAVE FAIR TRIAL

If a 6-cent fare were adopted and failed to produce the desired financial result, the tendency would be toward a still higher unit or toward a zone system with 6 cents as the minimum fare. It is easier to increase the minimum than to reduce it. When a company is in need of additional revenue, it hesitates to try a lower rate, and it is doubtful how far the commission may have power to compel such a trial to be made. On the other hand, if the zone system were now adopted, with 5 cents as the minimum, it would be a comparatively simple matter, if the results proved unfavorable, to change back to the present plan and try a uniform 6-cent unit.

In short, the commission remarks, the methods of increasing electric railway fares are now admittedly in their experimental stage. Rates of 6 cents, 7 cents and 8 cents and a mileage system of charging are all on trial in Massachusetts at present. Without in any way committing itself to any method which must necessarily be followed in other cases, the commission believes that the so-called zone system of charging which permits city systems to increase fares without raising the 5-cent rate in the central district ought to have a fair trial, and that, on present evidence, this method is especially well adapted to the Holyoke situation and likely to produce the most satisfactory results for all concerned.

FIRST ZONE PLAN IS MODIFIED

The general scheme for such a zone system which was suggested by the company is said to seem on the whole well-devised. The limits of the inner circle include the compact, densely-settled central district and appear to have been logically located. The two zone plans are very similar, and either one may be used as a basis. In taking the first plan, however, in the judgment of the commission, the following modifications should be made:

1. Tickets good for rides between points in the inner circle and points in the outer circle located on the West Springfield, Chicopee Falls, Chicopee Street, Fairview and South Hadley Center lines should be freely sold, both at convenient outside agencies and on the cars, at the rate of six for 40 cents, and the fact that such tickets are available should be advertised by conspicuous notices on the cars.

2. Provision should be made, either by ticket sale or otherwise, for a rate of 7½ cents for local rides between points in the inner circle and Smiths Ferry or intermediate points on the Northampton line, and between points in the inner circle and the city boundary or intermediate points on the Westfield line. On the latter line, the company may, if it desires, limit this local fare to the hours when workmen are going to or from work.

3. Lap-overs should be provided for the South Hadley Falls and Willimsett districts, so that passengers may ride

between South Hadley Falls and South Hadley Center and between Willimsett and other parts of Chicopee for a 5-cent fare. This can, in the commission's judgment, be done without great inconvenience to the company.

4. Special tickets should be sold at the rate of five for 50 cents good between points on the Fairview line and the city of Chicopee and points on the Chicopee Street and Chicopee Falls line in the same city.

5. Free transfers should be given at the City Hall to all points within the inner circle, and these should be available to passengers using tickets as well as to those paying cash fares.

The commission indicates no change in the case of the 7-cent fares proposed on the Amherst and Sunderland line, for the operation of this division has been unprofitable, and the company is fairly entitled to additional revenue, if it can be secured. The commission, however, suggests that the company, in its own interest, might well consider the adoption of some plan, either by the sale of tickets or otherwise, whereby local rides could be secured for reasonable distances within the town limits of Amherst at a rate not in excess of 6 cents.

It is possible that the 7-cent fare on this division may not result in the anticipated improvement, and the company, the commission says, should keep a careful record, so that its effect may accurately be determined with a view to possible modifications in the future.

This should also be done in the case of the plan as a whole. It should be clearly understood that the plan is subject to review at the end of one year with a view to possible modifications in the light of experience gained during that period and of the additional information which the company should in the meantime secure by an intensive study.

Courtesy and Safety

THE National Safety Council finds that there is a relation between handling complaints and insuring safety to passengers. The recent poster reproduced herewith tells its own story.

"I Take My Pen in Hand—"



Letter from a Peeved Citizen

Mister Manager:

You talk about your conductors working hard and being courteous. They do nothing nine tenths of the day but stand around and view the passing scenery. My wife with her child went down town the other day and the child is heavy to carry. When she got on the car did the conductor show sum of your famous courtesy and help her? He did not. Did the motorman start the car easy? He did not. Then when the car got down town did the conductor help my wife and child which was heavy to get off? Helino. Your conductors are loafers who are afraide to do a little cortsy for fear it will strane there back. What are you going to do about it?

A PLANE CITISEN.

It Is Not Entirely a Matter of Courtesy—But One of Safety

A FORCEFUL N. S. C. COMPLAINT-SAFETY POSTER

Railroad Electrification as a War Measure

The Author Shows that It Will Be Profitable
in Spite of the High Cost of Labor and Materials

By F. E. WYNNE

Engineer Railway Section, General Engineering Division,
Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

TRANSPORTATION, whether by rail, water or highways, is a most vital factor in prosecuting the war. The service demanded of the railroads of the United States by the present immense volume of traffic, largely due to the requirements of war, has demonstrated very clearly the inadequacy of our existing railroad facilities. Among the urgent necessities of the situation are larger and better arranged terminals, greater track capacity, increased train loads, higher speeds, more efficient motive power, and the conservation of fuel, materials and men. The practical patriotism which the railroads have displayed in combining management, facilities and equipment for the period of the war is accomplishing wonderful results of incalculable value. However, as the situation becomes more acute, through consumption of men and materials, other means may be necessary to secure the essential result.

The *Bulletin of the National City Bank of New York*, for November, 1917, on "Economic Conditions," contains the following comment:

There is naturally a feeling of uncertainty and apprehension as to industrial conditions after the war. The demand for war materials will fall off, the supply of labor on the market will be greatly increased, and it is a question whether all of this labor can be promptly placed in employment. It will be the most stupendous reorganization of industry ever known, and it is going to be a great social problem to accomplish this change without confusion, loss of confidence and a period of stagnation. It is important that plans be laid on a large scale to take up the slack, and other countries are laying them. In this country, ready at hand, is the task of equipping the railroads, and other industries where practicable, to operate by electric power. . . . The amount of work in sight, if a general scheme of electrification was undertaken, would be sufficient to relieve the business community of its fears as to idleness and poor trade for some years to come, and would thus encourage other enterprises to go ahead.

The danger will be in a pervasive feeling of uncertainty, causing men to wait with their own plans until they can discern the general trend, and waiting of itself slows down business. Large plans for the employment of labor which can be brought definitely forward at the critical time will serve to inspire confidence and support the whole situation.

It seems pertinent at this time, therefore, to consider seriously what electrification is capable of doing for the railroads now, at the same time bearing in mind the desirability of making definite plans for electrification when peace is finally secured. Conservation of fuel is highly important, not only in order to meet the extraordinary demands of our government and the industries and for export to our Allies, but also because every reduction in fuel movement for domestic purposes adds to the equipment and track capacity available for moving export shipments. Electric operation lends itself to fuel conservation in two ways; either water power is substituted for steam power, or the necessary steam power is produced in a central power plant more economically than by burning fuel on locomotives. In the first case, all of the fuel used for train propulsion, fuel

handling and haulage (which may be as high as 10 per cent of the propulsion fuel), water pumping, etc., is saved for other purposes. In the second case, approximately one-half of the fuel is conserved, it being a well-established fact that 1 lb. of coal burned in a modern electric power house will produce as much transportation as 2 lb. burned in steam locomotives.

The government requirements for fuel oil are enormous and the supply is restricted on account of the reduced output from domestic fields, Mexican conditions and the fact that the Roumanian fields are in the possession of the Central Powers. Railroad electrification could relieve this situation considerably and water powers are already available or may readily be developed for the electric operation of many of the most difficult sections of the railroads now using oil-burning locomotives. However, the smaller fuel consumption now obtainable by the use of steam-driven stations is equally as important as the utilization of water powers, because the densest railroad traffic and the greatest congestion is in territory within easy range of the best coal fields, but where water power is scarce or extremely costly to develop.

ELECTRIFICATION A CONSERVATION MEASURE

At first glance, electrification may seem not to tend toward the conservation of materials. The construction of overhead lines, substations and possibly power stations calls for a large amount of material, a considerable proportion of which is copper and steel. On the other hand, fewer electric locomotives than steam locomotives are required to produce the same quantity of service. Where congestion is becoming unendurable electric operation will give relief which, with the continuance of steam power, could be obtained only by building additional tracks and greatly increasing the steam motive-power equipment. The steam locomotives released by electrification and the cars relieved from hauling railroad fuel take the place of new locomotives and cars for increasing the capacity of unelectrified divisions. It is apparent, therefore, that these features indicate the conservation of materials by means of electric operation.

Diverting millions of men from peaceful pursuits to war activities impose upon those remaining the duty of working more efficiently. To this end, machinery must replace and release men to a greater extent than heretofore. Railroad electrification helps to conserve man power both directly and indirectly. Since it has been proved practicable to build, and operate with one engine crew, electric locomotives more powerful than steam locomotives, fewer enginemen are required to handle a given traffic electrically. Not only can larger trains be operated at higher speeds, but delays on the

road are materially reduced and there is less overtime and little conflict with the sixteen-hour law. The operation of larger trains at higher speeds also decreases the number of train crews for a given traffic. Material reduction in the roundhouse and shop labor of caring for and repairing motive power is found with electric locomotives. This is effected largely by the elimination of the boiler, firebox and tender which are essentials of the steam locomotive and by the longer time possible between "shoppings."

The combination of engine divisions, together with more exact and more reliable movement of trains with electric power, makes possible a further conservation of man power by reducing the number of dispatchers required to operate a given trackage. The indirect reduction in men comes chiefly through the fuel reduction or elimination. This releases men from mining coal or producing oil, from handling this fuel, and from operating and maintaining equipment in railroad fuel service, so that they are available for performing similar or other service in producing fuel and transportation for the needs of our government, industries and Allies. Of course, all of the man power thus conserved is not a net gain, because the maintenance and operation of power house, substations, transmission and distribution systems require the time and energies of some men not employed in the operation of a steam railroad. However, in any case, the net reduction in men required is great and increases more rapidly than in proportion to the extent of the electrification.

SAVINGS FROM INCREASED TRACK CAPACITY

One of the greatest benefits derived from electrification is the increase in track capacity without laying additional rails. Probably there are few places where, under steam operation, the capacity of existing track could not be increased by the use of larger, more efficient locomotives, changes in train make-up, increased car-loading and modified operating conditions such as the "sailing dates" for l.c.l. freight recently introduced on certain railroads. All such improvements can be secured equally well with electric operation, and in addition still larger trains may be operated at higher speeds with greater safety and reliability and fewer delays. These results are obtained through the ability to concentrate in an electric locomotive greater power than in a single steam locomotive, to operate locomotives in multiple, and in the electric locomotive's smoothness of control, its greater availability for service, the greater mileage between overhauling periods, the reduction in railroad fuel handled, the less serious nature of road failures, the elimination of intermediate engine terminals, and the definite speed of operation on the road.

The movement of trains at higher speeds with fewer delays and less damage enables greater mileage to be secured from cars in a given time. This saves time in furnishing any quantity of transportation service and the time thus conserved is equivalent to increasing the number of cars available for service. In fact, it is more than equivalent, for there is less likelihood of congestion in handling a certain traffic with 1000 cars than if 1200 cars are required to accommodate the same traffic.

The *National City Bank Bulletin* for December, 1917, contains the following:

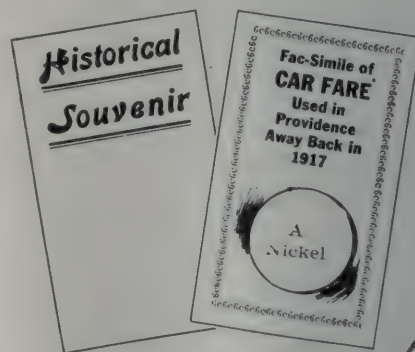
The industries cannot expand beyond the limits fixed by the supply of pig iron, coal and railway service. If government funds can be used to remedy this situation it will be the most effective use to which, at this time, they can be applied. Here is the narrow place in the road, and if it can be widened the energies of the country will produce immensely greater results.

Electrification is admirably adapted to "widening the narrow places" in the railroads. The greatest congestion, aside from terminals, occurs on roads handling ore, fuel, grain and munitions. The suggested use of government funds (where necessary) to assist in relieving this congestion appears to be both legitimate and logical. Government assistance might be secured in getting priority of manufacture also, since the apparatus to be built would be utilized to improve transportation facilities largely for government business. The manufacture of a number of electric locomotives would release a much larger number of steam locomotives and take some of the present burden from the steam locomotive factories by reducing the number of boilers, tenders, engine frames and running gears which such factories would have to build for a given amount of relief.

Not only must maximum capacity of existing facilities be secured but increased facilities at the weak points of our transportation systems should be provided with the utmost speed. Labor should be diverted from non-essential channels to the construction of these additional facilities. The diversified character of the materials and apparatus used and the greater service obtained from equal weight of material in electrical service make it practicable to secure a definite increase of railroad facilities with electrification more readily than by building additional tracks, widening tunnels and bridges and building additional steam locomotives. Incidentally, in many cases, electrification is economically the best method of securing such increase in track capacity. It appears, therefore, that intelligent consideration of the present situation, the probable duration of the war and the future of the country, carried on jointly by our government and the railroads, should lead to some electrification immediately and to the greater use of electric power by railroads when peace comes.

"Looking Backward"

THE Rhode Island Company, Providence, R. I., at a recent souvenir dinner of the "Town Criers" did a little advertising stunt that created considerable com-



SOUVENIR DISTRIBUTED BY RHODE ISLAND COMPANY

ment. At each plate it caused to be put a little "historical" souvenir (1 3/4 in. x 3 in.), showing a fac-simile of the car fare used in Providence "away back" in 1917. The idea seemed to make a hit with the diners.

Reasonable Rate of Return Has Advanced

At Recent Milwaukee Fare Hearing Mr. Mortimer Discussed Hazards and Needs of Electric Railway Industry—Fundamentals of Proper Wage Basis Outlined—Need Emphasized of City Co-operation in Effecting Economies

AT A HEARING before the Wisconsin Railroad Commission on Dec. 20, on the application of the Milwaukee Electric Railway & Light Company and the Milwaukee Light, Heat & Traction Company for revision of rates of fare, filed on Nov. 6, 1915, J. D. Mortimer, president of the petitioning companies, testified as to additional revenue requirements, efforts in economy and efficiency, and prevailing rates of return on public utility investments. A synopsis of Mr. Mortimer's remarks is given in subsequent paragraphs.

HOW THE INVESTMENT HAS GROWN

The original cost of the railway property of the Milwaukee Electric Railway & Light Company on Dec. 31, 1916, was \$19,972,896, amounting to \$.433 of investment per \$1 of annual operating revenue. The corresponding ratio for the year ended Dec. 31, 1911, was \$.418 of investment per \$1 of annual operating revenue. The increase in investment per \$1 of corresponding operating revenue during the five-year period was \$.525.

The original cost of the Milwaukee Light, Heat & Traction railway property on Dec. 31, 1916, was \$9,204,441. This investment was \$.913 per \$1 of annual operating revenue. The investment ratio was much higher in the case of this company, with its suburban and interurban business, than in the case of the Milwaukee Electric Railway & Light Company, serving the city business, due to the difference between the annual earnings per mile of track.

The ratio of operating expenses, including depreciation, to operating revenues for the twelve months ended Oct. 30, 1917, in the single-fare area was 82.7 per cent. To produce an 8 per cent rate upon the property would have required an operating ratio of 68 per cent, and it would have been necessary to increase revenues \$723,377 to achieve this ratio. The ratio of utility capital to operating revenue would then have been reduced to \$.349.

1918 WILL SEE HIGHER COSTS

These figures, Mr. Mortimer said, summarize conditions as they obtained during the twelve months ended Oct. 31, 1917, and do not cover increased operating expenses which will be experienced during the ensuing year. The largest single item of expense is the wages of the trainmen, and it is believed that these should be increased at least 15 cents per man-hour. Such an increase when applied to the city and suburban zones would amount to \$660,000.

Another item of increase is the cost of power. For the twelve months ended Oct. 30, 1917, this amounted to \$566,193. Coal cost \$3.67 per ton. For October coal cost an average of \$4.35 per ton, while effective Nov. 1, 1917, there was a further increase in price of coal of 45 cents per ton. In view of the possible further increases in cost of coal at mines, increase in freight rates, war tax on freight and increase in storage and

handling costs, it is reasonable to predict that the cost during the ensuing year will be increased an additional 75 cents per ton. Substantial necessary increases are also scheduled for labor in power plants and substations. The total increase in power cost will amount for all railway departments to \$253,200, of which \$223,000 is applicable to the city and suburban fare zones.

Maintenance of equipment costs are similarly estimated to increase \$110,000, of which \$96,700 is apportionable to the Milwaukee city and suburban system. Maintenance of way and structures expenses are anticipated to increase \$106,300 for the entire system, \$75,400 for the urban and suburban business. Wages of miscellaneous car-service employees, carhouse employees, car cleaners, telephone operators and miscellaneous transportation expenses are likewise estimated to increase \$88,756 for the system as a whole, of which \$82,100 would be chargeable against the Milwaukee city and suburban zone. Mr. Mortimer also pointed out that many of the items of general expenses, undistributed expenses and taxes will sustain important increases, estimated at \$184,100 for the entire system and \$167,000 for the Milwaukee city and suburban zones. Summarizing the probable increases in operating cost, Mr. Mortimer stated that these were estimated at \$1,471,550 for the entire railway department and \$1,304,200 for the city and suburban business.

REASONABLE RETURN TO-DAY HIGHER THAN YEARS AGO

Mr. Mortimer then noted important changes that have taken place in the returns demanded by investors in electric railway securities. The capital invested in public utilities is planted and must be considered as invested in perpetuity. The problem of determining a reasonable rate of return is necessarily one of the future. The investor considers the actual return which his money will earn in good years and bad, and the prospects for future increase. No investor will knowingly put money into an enterprise where prospects are they will suffer loss. The prospects for future increases either in rate of return or in margin of safety are very important considerations in inducing investors to part with their savings.

In Mr. Mortimer's opinion, the great mistake made by regulation in many states is that its calculations have been based entirely on past records without forecast of future conditions. When, about ten years ago, commissions announced that a return of 7½ to 8 per cent, made up of 6 per cent for interest or pure cost of money and 1½ to 2 per cent as profit of the proprietor, would be allowed on capital invested in public utilities, investors assumed that these returns would be assured in bad as well as good years. Such a policy had a tendency to stabilize investment values. The failure of such returns to materialize during periods of depression has now placed public utility investments in a semi-hazardous class.

Investors expected that all new investments made since the beginning of regulation would be allowed at least the announced rates of return. They did not anticipate that these investments would be subjected to valuation at amounts considerably below the actual investment. It was also not anticipated that the rise in commodity prices and in rates of wages would outrun any possible economies which could be effected, nor was the full effect of additional burdens through the exercise of municipal police powers and by the imposition of service orders by regulating commissions appreciated either by the investors or by the commissions. Returns have accordingly not been stable.

At the present time the enormous government borrowings running far beyond anything in this country's experience, and paying much higher than the usual rate of interest of borrowers in pre-war days, have contributed to a rapid rise in the old interest plane. The problem of reasonable return to-day is accordingly a very different one from what it was nine years ago when interest rates were on a much lower level than is now the case. Returns of $7\frac{1}{2}$ to 8 per cent are to-day wholly inadequate for the purpose of securing additional capital to flow into the business. A return of 10 per cent to 12 per cent might accomplish such a result, but this is not at all certain.

Shortly after April, and for a few months during the summer, it was possible for public utilities to finance themselves temporarily by the sale of short-term notes secured by bonds, but the interest-rate cost to the issuing company was 8 per cent per annum or more. This figure is higher than public utilities are earning, but even then the amount of money that could be secured by this means was comparatively small. It is a well-established economic fact that there is a marked tendency for security values to depreciate as the prices of commodities rise—that is, the interest yields increase with an increase in commodity prices. Hence, Mr. Mortimer said, it would appear that in the ideal system of regulation there should be some advance in the reasonable rate of return as commodity prices increase in order to parallel as far as practicable the increasing cost of money and the other factors that go to measure a reasonable return from time to time.

HAZARDS OF THE ELECTRIC RAILWAY BUSINESS

The hazards of the electric railway business are very important considerations in determining whether or not it is a good business for a man to engage in as an employee or wage earner, and as a business in which to invest money. The particular hazards of the business enumerated by Mr. Mortimer are variation in gross earnings arising from fluctuation in business conditions, competition with other forms of transportation, small rate of growth of earnings, the general rise of the wage level and cost of materials, higher service standards, increased wages, unproductive investments required by municipal enactment (such as paving within the track zone, placing wires underground, grade crossing separation and abandonment of existing lines before the normal useful life of the utility property has expired) and uncertainties of valuation arising out of lack of agreement on fundamental principles.

The rate of return upon the bare cost of reproduction of the physical property used and useful in the single-fare and suburban areas amounted to 4.52 per cent for

the year ended June 30, 1914; 3.28 per cent for the year ended June 30, 1915; 4.23 per cent for the year ended June 30, 1916; 4.79 per cent for the year ended June 30, 1917, and 4.20 per cent for the year ended Oct. 31, 1917. The basis upon which these returns are computed does not include working capital, stores, or going value. The cost of money can be reduced and the rate of return stabilized by contractual guarantees on the part of the municipality. This method will go some distance in reducing the cost of capital and the cost of service.

RATE REGULATION SHOULD BE AUTOMATIC

In Mr. Mortimer's opinion, regulation of rates of fare or lengths of haul should be automatic. It should not be necessary that the commission be required to hear a case on a petition initiated by some party every time the rate of return increases or decreases one-half of 1 per cent. It is entirely conceivable that the commission can establish fundamental factors upon which the rates of fare are to be computed or the distance traveled for the same fare and have the same modified automatically at three or six months intervals as the conditions of the time demand.

WHAT CONSTITUTES A PROPER WAGE?

With respect to the wage policy of the company, Mr. Mortimer pointed out that public utility employment should be the most stable and best paid in the community. Economy can only be obtained with competent employees, and the greatest competency can only be obtained by stable service. Stable service requires most favorable working conditions, such as the eight-hour day and the highest rate of wages. It is believed that the public desires well-paid employees.

The index number of the cost of living indicates a substantial increase in living cost. If the year 1914 is taken as a reference wage basis, the relative cost of living may be taken as 146. The relative average for the year 1916 would then be 176 and for the year ended Oct. 31, 1917, it would be 259. The cost of living for November, 1917, alone shows an increase of 90 per cent over that obtaining in 1914.

The management of the Milwaukee companies believes that the proper wage should consist of three elements: (1) a component that would measure the cost of the necessities of life and vary at six months intervals with some reliable index number of commodity prices; (2) an amount determined by individual or group efficiency according to reference standards, and (3) an amount determined as the employees' share of surplus profits. The company has numerous profit-sharing plans in operation, but it has been unable to include in these the sharing of surplus profits since such profits did not exist.

It is expected that during the continuation of the war there can be no additions to the electric railway system. Such a policy is in the interest of the nation, in order that all money, materials and labor may be available for the use of the government as far as practicable.

ECONOMIES POSSIBLE WITH MUNICIPAL CO-OPERATION

As affecting the increased costs of operation, however, Mr. Mortimer averred that there are opportunities for economy through a policy of co-operation with

the municipal authorities. An increase in schedule speed by introducing alternate stops would permit a reduction of about 8 per cent in car-hours for the same number of car-miles. The number of car-miles operated can be further reduced by modifying service standards to conform to wartime conditions. Economy can also be effected by modification of present ordinances relating to car heating. There are substantial opportunities for economy in relief from such unnecessary burdens as sprinkling streets, removing snow and ice, paving within track zone and changing track grades.

A hostile municipal administration increases the hazards in the business and increases the rate of return, by not less than 1 or 2 per cent, which investors have a right to demand as reasonable before placing their capital at the disposal of the public. The advantages of open municipal co-operation are readily evident, and no municipal or state official is performing his sworn duty when his official acts are hostile to the public utilities serving the district in which he acts.

In conclusion, Mr. Mortimer stated that the present methods of regulation are much too ponderous and slow to meet the requirements of the times. Near-bankruptcy must be shown in order to procure adjustments of fares, hauls and service.

Parcel Freight Plan for Chicago

Tentative Ordinance to Be Prepared—Conference Between Aldermen and Companies Brings Out Important Points Regarding Freight Possibilities

REVIVAL of a plan to permit the elevated and surface lines in Chicago to carry package freight was initiated on Jan. 4 at a meeting of the local transportation committee of the City Council. The discussion resulted in a request on the Corporation Counsel to provide the companies with a draft of a proposed ordinance to be worked out by them in a form satisfactory to all parties.

Representatives of both systems agreed to hurry up the presentation of a tentative ordinance. The aldermen conceded that the public probably would not object to the hauling of freight cars if there was no interference with passenger transportation. It is thought that an ordinance can be drafted which will specify certain classes of freight to be handled and will permit the cars to be operated during all except the rush hours.

NO HEAVY INVESTMENT FOR SHORT-TERM USE

An important point brought out by the traction representatives, John E. Wilkie for the surface roads and G. T. Seeley for the elevated lines, was that the railways should not be required to make an investment in switch tracks, sidings, elevators and connections between the two systems under a short-term arrangement. Such changes would require a heavy investment, and there was no assurance that the plan would be accepted if its operation were only for the war period.

GENERAL HAULING AND TWO-WAY BUSINESS DESIRED

For some years past there has been discussed at intervals a plan to haul market produce on the tracks of both systems. The surface lines already haul garbage cars under an arrangement with the city, which provides a safe margin of profit. There is also a limited handling of small freight over one of the city lines by cars of

the Kankakee Interurban, reaching to Sixty-third Street, a point about 7 miles from the downtown district. All this business, however, is confined to a few hours after midnight.

The electric lines contend, however, that an increase of such business would not be worth while unless the period for freight handling is extended to cover all hours of the day other than the rush hours. Another contention is that any ordinance to be favorably considered should provide for the hauling of such classes of freight as would give a two-way business.

The elevated roads are in a favorable position at the present time to handle considerable merchandise if satisfactory arrangements can be made for connections with the Great Lakes Naval Training Station, Fort Sheridan and Camp Grant.

The surface lines, of course, cannot compete for such business. One handicap under which they labor is the type of rail, which will not permit the use of the ordinary interurban car wheels. It has been suggested, however, that a wheel design could be worked out for freight cars of the surface and elevated lines, which could be used by both.

POSSIBILITY OF DEPARTMENT STORE TRAFFIC

The management of the Chicago Surface Lines some time ago endeavored to interest the large department stores in a proposition to take merchandise from the downtown stores to outlying distributing stations owned by these stores. This would have meant the handling of such business after midnight. The department store officials were somewhat interested, but they said that a large portion of their purchases must be delivered the same day. It is thought, however, that the patriotic spirit inspired by war times might bring about such a change in public sentiment as would permit the delay of such shipments for a possible twenty-four hours. This would give the stores and the companies an opportunity to get together on the night-handling of such packages.

Another objection made by the stores was that they have a large investment in motor vehicles, which could not be used for another purpose. They also contended that they would lose a certain amount of advertising by the removal of such motor trucks from the street. Some aldermen, however, have gone on record as favoring a reduction in the number of such trucks, because of their noisy operation and their wear and tear on pavements.

QUESTION OF MILK DISTRIBUTION IMPORTANT

The question of milk distribution also enters largely into the present discussion. The Aurora, Elgin & Chicago Railroad, which operates to the city's center, is permitted to haul freight cars only to a point about 7 miles distant from the downtown district.

Mr. Seeley referred to the handling of freight in Detroit, Boston and Philadelphia. He said that in Detroit the company handles about 90 per cent of the milk entering that city.

According to the *Manchester Dispatch* the Germans have built a large number of trackless trolley lines as a substitute for motor bus transportation. This is because of the scarcity in Germany of gasoline as well as rubber for pneumatic tires.

How Use of Fuel Will Be Economized

Fuel Administration Schedules Public Utilities for 100 Per Cent Supply for 1918

THE United States Fuel Administration has made public the method adopted for supplying coal and other power-producing fuel to the industries of the country classed as not absolutely necessary to the conduct of the war. The method is called the "coal-budget plan."

Committees representing the large industries not engaged in war work, more than one hundred in all, will be called into conference with the officials of the Fuel Administration. They will be shown the amount of coal available for all purposes, the amount required for war purposes and domestic consumers and the total curtailment of the use of coal which must be effected to satisfy these demands. They will be asked on patriotic grounds, as well as for their own future interests, to volunteer in behalf of their respective industries a reduction of the coal consumption for the year 1918. They will be asked to show the Fuel Administration the best method of accomplishing this curtailment. They will also be asked to advise the Fuel Administration as to how to arrange these restrictions so as to affect only the less essential portions of their own lines of business, if possible.

When an agreement is thus reached as to the quantity of coal to be conserved in each industry the Fuel Administration order will be issued, making this agreement effective as regards the total industry involved.

The voluntary annual saving shown by the first dozen industries called into conference promises to be between 15,000,000 and 20,000,000 tons. The total offering, from all non-war industries, will be between 36,000,000 and 50,000,000 tons for the year 1918.

One of the striking instances of curtailment is in the brewing industry. Representatives of the American Brewers' Association and others affiliated with the industry, after a conference with the Fuel Administration, volunteered a reduction of 700,000 tons annually. Other industries whose representatives have been to Washington already are paint and varnish, wall paper, confectionery, artificial ice, boxboard and glassware. The voluntary reduction of one day's running per week on the part of the boxboard manufacturers amounts to 1,000,000 tons a year and will take 30,000 carloads of merchandise freight off the congested railroads. The Fuel Administration asks that other industries affected get in touch with Washington without waiting for formal notice.

It is believed that the operation of this plan of voluntary conservation on the part of non-war industries will forever lay the ghost of the "cut-off-the-non-essential-industries" agitation, which has been going on since the United States entered the war, and automatically will balance the relation between the production and consumption of coal and prevent any repetition of the present coal shortage.

It is not the least of the merits of this plan, according to the Fuel Administration, that it is simple. Perhaps its greatest merit lies in that fact that such restrictions on fuel consumption as are absolutely necessary to keep the budget balanced will be arranged by the industries restricted and will be volunteered by

them. The Fuel Administration merely comes in at the end with an order to make the voluntary curtailment fully effective.

Fuel needed in 1918 for army and navy purposes, for munition works, for public utilities, for domestic consumers, and for factories working on war material is scheduled in the budget for 100 per cent fulfillment. With this figure, and the estimated production of coal during 1918 as a basis, a subtraction shows the amount of fuel left for non-war industries.

The percentage of reduction asked of the different industries by the Fuel Administration will, of course, vary, partly upon advice of the leaders of each industry as to what is practicable and safe shrinkage as compared with the great business activity of 1917; partly, also, it will vary with the character of the business. In proportion as an industry contributes less to the war of domestic necessities, it will naturally increase its contribution of self-limitation.

One advantage of the plan is elasticity. The total curtailment of coal consumption when completed will theoretically equalize the coal demand of the country with the coal supply for 1918. If later it turns out there is still a prospect of scarcity, a slight increase of the voluntary curtailment can be arranged instantly and without confusion. Every industry through this first order will be in touch with the government and its requirements. It can put into effect a still further curtailment if necessary, or it can quickly increase its activity if notified by the government at a later date that the curtailment already arranged appears to be excessive.

This plan, if completely successful, will quickly solve the fuel problem and will introduce a new and valuable principle into the settlement of many difficult war problems. First: Advantage is taken of the unquestioned patriotism of a large majority of business men to devise with their aid an intelligent program of curtailment, sufficient for government purposes but not destructively exaggerated. Second: An order of the Fuel Administration backed by the authority and penalties of the Lever law will compel an equal compliance by every member of each industry and thus assure those who would gladly make their share of the sacrifice that no advantage will be taken of their patriotism by unscrupulous competitors.

New York Fuel Conservation Committee Holds Meeting

THE fuel conservation committee for the electric railways of the Second Public Service District held a meeting at Rochester on Jan. 10. In addition to the members whose names were printed as members of this committee last week, W. J. Harvie, president Syracuse & Suburban Railroad, is a member. H. B. Weatherwax, vice president United Traction Company, Albany, is chairman of the committee.

After a week's shutdown at the Fern Hill coal mines outside of Owensboro, Ky., due to the blocking of railway tracks by snow, the Owensboro Street Railway finally prevailed on the miners to get to work and clear the track.

Loading Surface Cars at 400 Passengers Per Minute in Detroit

Through Co-operation with the Ford Motor Company
Detroit United Transports 30,000 Employees
in Seventy-five Minutes

BY W. E. CANN

Assistant to the General Manager Detroit United Railway

THE transportation of the employees of the Ford Motor Company has presented problems of no small difficulty to the transportation department of the Detroit United Railway. In spite of the company's best efforts it found great difficulty in handling crowds of 10,000 to 20,000 men, all anxious to get home on the first car. There was so much crowding that many fares were missed, intending passengers even climbing into the cars through the windows. After some months of this experience and without being able, even with the

both the motor car and the trailer are stationed employees of the railway company, the man at the motor car being a car starter who dispatches the cars at regular intervals. During the rush-hour peaks in the evening this interval is about thirty seconds. The employees form in two lines, the line nearer the track entering the front car and the other the trailer. When the starter decides that a car is to leave he steps in behind the last passenger on the steps, the man at the trailer car door, who is watching for this move, doing the same. These two men see that the car doors are closed and the car starts on its trip.

For the first week or two of this operation there were some difficulties in keeping the men in line, but after the Ford Company had discharged some of the most obstreperous of its men, the employees began to realize that it was to their advantage to line up and to board the cars in an orderly fashion and in their proper



SCENES ON WOODWARD AVENUE, DETROIT, SHOWING MANNER OF LOADING CARS AT THE FORD MOTOR COMPANY'S WORKS DURING THE AFTERNOON RUSH HOURS

assistance of special police officers and carhouse employees, to develop any semblance of order, the company appealed to the Ford Motor Company for co-operation. As a result a plan has been put into effect which has given very satisfactory results. The operation of the plan is shown in the accompanying photographs.

Now between the hours of 3.30 p. m. and 4.45 p. m. there are handled at the Ford plant approximately 30,000 to 40,000 employees of the plant, and this with good order and dispatch. The benefits of a systematic and just loading plan are now so apparent to the men themselves that they would hesitate before going back to the old way even if given the opportunity. The pictures show the loading only on Woodward Avenue, but the same arrangement is in effect at four or five other points on the streets and on the company's own property in the vicinity.

The plan is simply this: At the entrance doors of

turn. They insisted that the last men to arrive should always be forced to fall in at the tail end of the line.

Under the present arrangement cars leave the Ford works, generally speaking, with something less than a seated load, thus allowing the crews to pick up passengers on the way downtown. It might seem at first that it would be difficult to overcome the objections of men to being stopped from boarding a particular car when there is still room inside. Fortunately the justice of leaving some space for passengers who may wish to board later appeals to the men, and now any dispute is stopped by them by the simple expedient of pulling an objector out of the line and forcing him to the rear.

A committee of prominent railway men from the East who visited Detroit recently to study the operation of this loading plan stated that they considered as no less than remarkable the way in which co-operation had been secured.

"Credit System" of Wage Payments in Chicago

A Novel Plan for Encouraging Long Service Has Been Introduced by the Chicago Motor Bus Company—Each Employee's Earnings Are Based Upon the Length and Character of His Work, the Older Employees Sharing Also in the Profits of the Company

A NOVEL system of wage payments has been adopted by the Chicago Motor Bus Company, whereby each employee's earnings are dependent upon a "rating" that is established by the length and the character of his services. The new plan, which has been called the "Credit System" by its originator, Harold B. Weaver, vice-president of the company, applies to all drivers, conductors, starters, inspectors and others occupying comparable positions. Its application is effected by means of "credits" which are given for each month's service and entered upon each employee's record, certain "discounts" being deducted from the total in case the employee violates rules of the company. Older employees who, by their long service have acquired a very large total number of credits, participate to a certain extent in the company's earnings through "employees' dividends," these being declared as a percentage of the employees' annual earnings at the same percentage rate as is paid upon the company's stock.

CREDITS AND DISCOUNTS

There are three kinds of credits, as follows: Regular credits, which are given for one month's service; Extra credits, which are given for continued perfect service; Bonus credits, which may be given in the discretion of the company for extraordinary services or on a competitive basis under prescribed conditions.

Regular credits are given at the rate of twenty-five for each month that an employee remains in the company's service, regardless of his capacity. Extra credits are given after any three consecutive calendar months of perfect service, that is to say, three calendar months during which no discounts have been imposed. Such employees receive five extra credits per month from the fourth to the ninth month (inclusive) of continued perfect service, and thereafter are given ten extra credits from the tenth to the twenty-first month (inclusive), subsequently being given fifteen extra credits per month so long as perfect service is continued. Bonus credits may be given at any time for extraordinary services or unusually efficient work, upon the recommendation of a superior officer and with the approval of a board of employees of the same rank as the recipient.

In the case of violation of any of the rules, there shall be charged to the record of an employee a number of discounts ranging from one to fifty, according to a printed schedule of discounts. These discounts are imposed only by the heads of departments or general company officers, and their application cannot be remitted in case infractions of discipline have actually taken place. Neither can there be imposed any greater number of discounts than fifty for any particular offense.

The record of each employee's credits and discounts are kept by the company, and each employee has the right of access at any time to his own record, but not

to the record of any other employee. The total number of credits obtained from all sources and total number of discounts imposed for all reasons are totaled at the end of each calendar month, and the total number of discounts subtracted from the total number of credits. The balance of credits represents the "rating" of each employee, and this rating is used as the means for determining his rate of wage and, subject to certain conditions, his right of preference as to work and promotion.

Whenever discounts are charged against the record of an employee, written notification is submitted to him,

	PER HOUR		PER WEEK		Length of Service on basis of 25 Regular Credits per Month without Extra Credits or Bonus Credits.	Length of Service on basis of Perfect Service, with Extra Credits but without advantage of Bonus Credits.		
	Conductors	Drivers	Starters	Inspectors				
GRADE G	26c	30c	\$22.00	\$23.00	EMPLOYMENT 6 Months 1 Year 1 Year 6 Mo's 2 Years	EMPLOYMENT 6 Months 1 Year 1 Year 4 Mo's 2 Years 4 "	Period of Wage	
" F	27c	30c	\$22.00	\$23.00				
" E	28c	32c	\$23.00	\$24.00				
" D	29c	33c	\$23.00	\$24.00				
" C	30c	34c	\$24.00	\$25.00				
" B	31c	36c	\$24.50	\$25.50	3 "	2 " 11 "	Period of Wage and Participation in Profits	
" A	32c	36c	\$25.00	\$26.00				
GRADE 5	Wages of Class A and 1 Unit of Employee Dividend				5 "	5 " 5 "		
	" 4	Wages of Class A and 2 Units of Employee Dividend						
		Wages of Class A and 3 Units of Employee Dividend						
		Wages of Class A and 4 Units of Employee Dividend						
		Wages of Class A and 5 Units of Employee Dividend						
Thereafter								

CREDIT SYSTEM OF WAGES—CHART SHOWING WAGE RATES AND PERIOD OF SERVICE REQUIRED FOR EACH

and in the event that an employee believes a charge of discount to be unjust or otherwise in error, he has the right of appeal by signing his name in the space provided on the notification for that purpose. Such appeals are heard before a board appointed by the president of the company from among officials equal or superior in rank to the one imposing the discount. Witnesses in such hearings may be called by either side, and these are paid their regular rate of wage for the time thus occupied.

EFFECT OF DISCONTINUANCE OF SERVICE

In the event that an employee resigns or is laid off through reduction of force, or if for any other reason not reflecting upon his record he leaves the service of the company, he is given a certificate of honorable discharge which shows his rating at the time. If he again enters the service of the company he starts to work with all of the credits that he possessed at the time he left the service and is entitled to whatever rate of compensation this rating brings.

In the event that an employee again enters the serv-

ice of the company after he has been discharged for cause, he has to start on his duties without any credit whatsoever. Dishonorable discharge is brought about by a failure to perform work assigned to an employee, thus automatically forfeiting all credit acquired up to that time. Discharge is also brought about by the establishment, on an employee's record at the end of his first two months of service, of more discounts than credits. Also, any employee who has been with the company for a period in excess of four months and who for any period of three consecutive months averages less than fifteen credits per month, or for any period of six consecutive months averages less than eighteen credits per month, or for any period of one year averages less than twenty credits per month, is subject to discharge.

Demotion without discharge may be applied at the discretion of the company, but such demotions do not affect an employee's rating nor do they suspend his right to extra credits.

Credits continue to accrue to the benefit of an employee while on a regular vacation, but in case an employee obtains an extended leave of absence from work the accumulation of regular credits during the period of absence is in the discretion of the company, and extra credits for continuous good service do not accumulate.

EFFECT OF RATING ON WAGE

In the schedule of wages seven different classes are provided for, these differing from each other by increments of 1 cent per hour, each class including employees whose ratings, or net total of credits for each month have upper limits amounting respectively to 150, 300, 450, 600, 900, 1200 and 1500. The rates of wage applying to each one of these classes are more or less arbitrarily fixed and may be revised from time to time, the operation of the system being independent of the actual rates of pay by the various classes. Thus if the rate of wage for conductors in Class G (the lowest of the seven classes) is 26 cents, all conductors with ratings of less than 150 will get 26 cents per hour. When a conductor accumulates more than 150 credits he moves up into Class F and is paid 27 cents per hour.

For employees having ratings that are in excess of 1500 credits, there are provided five grades, and these employees, in addition to Class A wages, participate in the company's earnings through an "Employees' Dividend." This is declared at a rate which, if possible, is to be equal to the dividend declared on the stock of the company for the same period, but in no case is the employees' dividend to be less than at the rate of 3 per cent per annum. This dividend is to be based on the total amount of money paid during the period involved, as wages to each of the employees participating in the dividend.

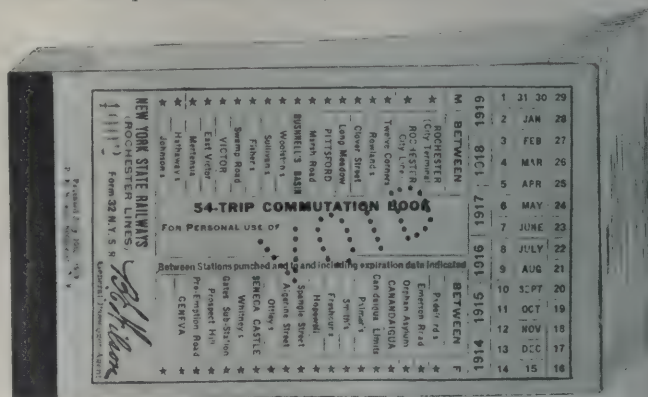
All employees in the five grades that have, during the period covered, earned an average of not less than twenty credits per month are to be entitled to participate in this dividend. Each of those in the lowest grade is entitled to an amount equal to the declared percentage applied to his total earnings during the period covered. For each employee in the next higher grade, the amount of the dividend is based on the same percentage as in the lowest grade, but this percentage is applied to twice his total earnings during the period covered. For the three higher grades the amount is

based respectively on three times, four times and five times the employee's total earnings during the period covered. Thus, if employees' dividend is 6 per cent, the employees in the highest grade receive bonuses equal to 30 per cent of their earnings during the previous year.

In general, it may be said that this system permits employees to enjoy an income which increases over a long period of time and is an inducement for them to remain in the service of the company. Long service not only produces individually efficient work, but also efficiency of the all-important character that co-operates with other members of the organization and is thus of special value to the company. The company recognizes that each employee who remains in its service has, in a sense, an investment value in the company. This is the investment of years of service which, except for general experience gleaned, is of no value to him in the service of another company. Naturally, such a principle points to an eventual participation in earnings by employees, but inasmuch as it is continuous service that is of value to the company, and since it is continuous service alone that is an investment by the employee, any participation must be purchased not with money but with time. In brief, the right to participate in earnings does not accrue to an employee who has not earned this privilege by a certain length and character of service.

Commutation Ticket Book for Interurban Railway Lines

THE New York State Railways and the Salt Lake & Utah Electric Railroad are using a form of commutation ticket book devised and patented by B. E. Wilson, general traffic and freight agent of the first-mentioned road. The feature is that all of the tickets are punched at one time to indicate the points between which the holder has purchased transportation.



COMMUTATION TICKET BOOK FOR USE ON INTERURBAN LINES

The punching is an easy matter and a punch suitable for the purpose can be had at a cost not to exceed \$1. On the New York State Railways a round hole about 1/16 in. in diameter is punched. This company uses a ticket 2 3/4 in. x 4 3/8 in. in size and a weight of paper such that the thickness of a fifty-six-ticket book, including both covers, is about 3/16 in. The Utah line ticket is 2 3/8 in. x 4 1/2 in., and it is on much lighter paper. The proper size and weight of ticket is a compromise of cost and of convenience in carrying the books and handling the coupons.

LETTER TO THE EDITOR

Fundamentals of Successful Transportation

BOARD OF PUBLIC UTILITY COMMISSIONERS

NEWARK, N. J., Jan. 8, 1918.

To the Editors:

In response to a notice on advertising page 20 of the *ELECTRIC RAILWAY JOURNAL* for Dec. 22; under the title "Have You Got the Goods?" I am inclosing a statement relative to the handling of passengers at greater speed, but with greater safety and comfort. While these suggestions are probably not entirely new to operating officials in general, yet their arrangement and grouping may place them before officials and others who may be interested in such a manner as will be conducive to a more intelligent, practical application of some or all of them where practicable.

FOUR FUNDAMENTALS TO BE CONSIDERED

To handle passengers with a maximum degree of speed, safety and comfort in connection with cars operated on surface lines, certain factors should be taken into consideration as follows: (1) Type of car. (2) Character of platform employees. (3) Character and distribution of traffic employees. (4) Education of the traveling public.

1. In designing cars with these objects primarily in view the following points should be observed: (a) Type, arrangement and location of entrance and exit. (b) Seating arrangement; width of aisle. (c) Height and type of step. (d) Type and arrangement of doors.

2. In selecting employees, especially conductors, observe the following: (a) Disposition. (b) Age. (c) Training.

3. As regards distribution and character of traffic employees consider: (a) Transfer intersections. (b) Other points of heavy loading or unloading. (c) Disposition of employees.

4. In educating the public, note the following: (a) Best method of advertising within the cars. (b) Best method of general advertising.

1a.—*Entrance and Exit.*—The rear-entrance and front-exit type, especially for urban and suburban service, furnishes the best type for speed, safety and comfort. For interurban service with few stops the rear entrance and exit will be found satisfactory, although the front exit in such cases is also recommended.

DESIGN OF CAR

1b.—*Seating Arrangement.*—For all urban and for short suburban service, longitudinal seats with ample aisle space should be adopted. For long suburban and for interurban service, cross seats with a reasonably wide aisle is advisable.

1c.—*Steps.*—Low steps should be adopted on cars for all classes of service. Height should not exceed 15 in. from rail to first step, 14 in. from step to step or step to platform, and 8 in. from platform to car floor. Shorter dimensions should be adopted wherever possible. Platform and car floor should preferably be on the same level on cars operating in all classes of ser-

vice. Steps should be of the folding type in all cases, except, possibly, for interurban service.

1d.—*Doors.*—Doors should be of the folding type, preferably manually operated. In the case of suburban service particularly, bulkhead doors and the bulkhead itself should be eliminated.

CHARACTER OF PLATFORM EMPLOYEES

2a.—*Disposition of Employees.*—One good-natured, even-tempered platform man, using good judgment, can accomplish more in the matters under consideration than a dozen men of other types.

2b.—*Age.*—Young men, and also many men of middle age, are best adapted for most efficient service.

2c.—*Training.*—Much can be accomplished in the proper training of employees in habits of courtesy, exercise of good judgment, etc., who without such training would be totally unfitted for the job.

DISTRIBUTION OF TRAFFIC EMPLOYEES

3a.—*Transfer Points.*—Inspectors should be stationed during periods of heavy traffic at all heavy transfer intersections. Their primary duty at such localities should be to facilitate and regulate the loading of cars and the dispatching of the same.

3b.—*Other Heavy Loading Points.*—Inspectors or other traffic men should also be located, during periods of heavy traffic, at all points of heavy loading other than transfer intersections. Their duties should be the same as mentioned in 3a.

3c.—*Disposition of Traffic Employees.*—Inspectors and other traffic employees should be men of good judgment and even disposition. They should be selected from among such platform men as have proved themselves most efficient in handling passengers.

EDUCATION OF PUBLIC

4a.—*Advertising in the Cars.*—Notices posted prominently and attractively in the cars requesting passengers to "Leave by the Front Door," "Move Up Forward," "Step Lively," "Put Yourself in the Other Fellow's Place," etc., materially aid in accomplishing the objects desired.

4b.—*General Publicity.*—Periodical publicity campaigns carried on through the local newspapers and other advertising mediums invariably bring about good results. Such notices or advertisements should be carefully worded and should demonstrate the many methods whereby patrons of the road may aid in promoting speed, safety and comfort of themselves, as well as of their fellow travelers.

GENERAL CONCLUSIONS

It is, of course, realized that *all* of the herein mentioned suggestions are not practically applicable in their entirety in all cases, or possibly in any one case, especially in the present period of abnormal conditions. These suggestions are submitted, however, as approaching what are believed to be ideal conditions for accomplishing the results desired. Any step in the directions suggested which has not been already adopted will be a further approach to the ideal conditions as set forth.

H. C. EDDY,

Senior Inspector of Traffic, Board of Public Utility Commissioners, State of New Jersey.

Council of National Defense Issues Extensive Report

More Than 400 Persons Were Engaged Continuously During the Past Year in This Work which Is Elaborately Organized

IN INTRODUCING a report of its work from inception to the end of the fiscal year closing June 30, 1917, Director W. S. Gifford of the Council of National Defense outlines the scope and purposes of the work of the Council. He states that the effort has been to make available to the United States the best thought and effort of American industrial and professional life for the successful prosecution of the war. The organization of the Council has endeavored to hold itself in readiness to meet new demands caused by the swift changes in strategy and rapid improvement in war machinery.

The several fields covered by the Council's work have been as follows:

1. Supervising co-ordination of purchases for the executive departments of the government, including the development of new sources of supply for both raw materials and finished products.
2. Standardization of specifications for tools and implements used in the manufacture of munitions.
3. Co-operative organization of transportation and electric communication for war service.
4. Inauguration with the government departments of an aircraft program and assistance in rendering this program an industrial possibility.
5. Organization for war of the medical profession.
6. Conducting a campaign to assist commercial business in meeting the demands made upon it by the war, and aiding establishments to make available for the needs of the government men, supplies, and equipments without impairing the essential service of trade and without imposing unnecessary hardship upon the people at large.
7. Development and stimulation of motor transportation facilities for government use.
8. Organization for common counsel of the leaders of the American labor movement, joined with representative employers and persons prominent in civic and industrial life, for the effective enlistment of the labor forces of the country for the conduct of the war.
9. Bringing together and concentration on war work of the engineering and educational professions, including the promotion of scientific research for the benefit of the national defense.
10. Effective centralization and direction of the efforts of American women on assistance in the conduct of the war.
11. Organization of the coal industry for more effective production and distribution of fuel.
12. Centralized direction of the activities of the several states in their effort to aid in war.

At the end of the fiscal year, the report states, there were 408 persons engaged on continuous work for the Council. Of this number 168 were receiving compensation and most of these were clerks and stenographers. This summary does not take into account the large number of additional volunteers who were devoting part of their time to the Council's work, whether in Washington or elsewhere.

Coal Shortage and Electric Railway Service

There Was No Material Change in Conditions During the Past Week—They Are Still Critical in All Sections

ALTHOUGH the United States Geological Survey reports a recovery from the recent "slump" in soft coal production, there is no evidence of adequate increase in production. December was the leanest month since April. The production was at the annual rate of about 545,000,000 tons, an increase of 8.3 per cent over 1916.

LIGHTLESS NIGHTS SAVE COAL FOR KANSAS CITY RAILWAYS

After a few days of mild weather at Kansas City, returning cold put gas usage out of the question. The new year found consumers using unusual means to economize in the use of coal to enable the Kansas City Railways to keep street-car service as nearly normal as possible and at the same time furnish a normal supply of current to the Kansas City Light & Power Company for distribution to homes and industries.

The advent of lightless nights makes an estimated saving of 150 tons of coal per week for the railway company. However, officials of the lighting company say that the success of the lightless nights depends more upon the patriotism of the average citizen than upon the big industries. More strenuous methods must be used, it is believed, to cause smaller consumers to economize on lights during the fuel shortage.

A propaganda is being started by Missouri officials to cause consumers of coal to purchase early next spring for use the following winter. State Fuel Administrator Crossley was in Kansas City on Dec. 30 for the purpose of instigating such co-operation on the part of consumers to guard against a repetition of this winter's crisis.

OHIO UTILITIES IN BETTER CONDITION

While electric-railway operation was far from normal in Ohio last week the actual danger of suspension had passed for the time because of the arrival of fuel sufficient to last until further expected shipments can be received.

It is hoped that the pooling plan devised by the coal operators, and the supervision of railroads by the government, will have the effect of furnishing a steady, if not a plentiful, supply hereafter.

Normal street-car, power and light service at Columbus depends in part on the transportation of coal from a mine in West Virginia in which the Columbus Railway, Power & Light Company purchased an interest last fall. Its contract provided for half of the output of 1500 tons daily, which should have increased the company's coal protection by 500 per cent for the winter. The government, however, commandeered the output for Eastern shipment early in the winter, and the company was left to do the best it could. This coal is now available, and the supply depends only upon the ability of the railroads to haul it. The company owns rights in slack piles in the Hocking Valley district, but transportation facilities are just as bad there. At present it is receiving a supply from day to day.

CONSTRUCTION, MAINTENANCE AND EQUIPMENT

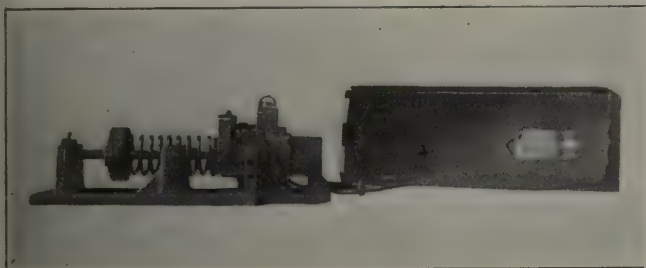
ENGINEERS, MASTER MECHANICS AND OTHERS WHO HAVE DEVELOPED ECONOMICAL PRACTICES, OR WHO HAVE WORTH-WHILE IDEAS ARE INVITED TO TELL READERS OF THE JOURNAL ABOUT THEM IN THIS DEPARTMENT

Decreasing Governor Maintenance

BY JAMES W. BROWN

Superintendent of Shops Wilkes-Barre & Hazleton Railway,
West Hazleton, Pa.

THE accompanying illustration shows a Westinghouse G.I.A. governor changed from a double to a single contact. This company has ten equipments of G.I.A. governors, now twelve years old. Up to five years ago we had a great deal of trouble with this governor due to the contacts burning off, the average length of time in service being about three months. They run now from



GOVERNOR CHANGED FROM DOUBLE TO SINGLE CONTACT

shopping to shopping, which means from eighteen to twenty-four months, and during the time since the change we have had no failures. This change was brought about by our air-brake inspector, Dave Kauffman. We put a long sliding contact on the coil side of the governor. This contact is a piece of tobin bronze $3\frac{3}{4}$ in. long, $\frac{3}{4}$ in. wide and $\frac{1}{4}$ in. thick, with about 3-lb. tension on the contact and only charged when the governor cuts in.

We made a sliding contact out of tobin bronze on account of its superiority over copper, as we found that two sliding contacts of copper do not wear smooth and soon cut, resulting in a sluggish governor, whereas tobin bronze with a copper contact sliding on it wears very smooth.



FRONT OF EMPIRE STATE REMODELED CAR, SHOWING CLASSIFICATION BULL'S EYES, AND LONG TRAIL CAR TRANSFORMED INTO INTERURBAN MOTOR CAR

Empire State Shop Notes

Large Interurban Car Remodeling Job Just Completed—Sheet Steel Pilot a Feature

WHEN J. C. Nelson took over the general management of the recently organized Empire State Railroad Corporation, a part of the former Beebe system centering at Syracuse, N. Y., he was in doubt as to the extent to which the federal government would require transportation for soldiers between points on the system and the temporary encampment located near the company's shops at Lake Shore Junction. Therefore, to be safe he decided to remodel six long interurban trail cars, built originally for summer traffic, by making motor cars of them and inclosing them for winter service. This job has been going through the Lakeland shops during the fall and early winter under the direction of A. B. Metcalfe, master mechanic, and the cars are now giving excellent service on short runs on the line between Syracuse and Oswego.

The cars formerly had low side sheathing with correspondingly deep windows. The sheathing has now been brought up to standard height, the line of the original sheathing and the added height being clearly discernible in the accompanying photograph of the complete car.

In accordance with the new color standards adopted by the company these cars have been painted a Pennsylvania Railroad red and varnished. They are striped in black and lettered in gold.

The bodies are mounted on light trucks, equipped with four 40-hp. Westinghouse 101-B motors, gear ratio 22 to 62. This power is ample, as the line is practically level. The truck frame carries a special sheet-steel pilot made in the company's shops. This weighs 150 lb. and is of No. 10 gage sheet. The pilot forms an excellent snowplow as well. As it is attached to the truck frame rather than the car body, its motion with

Experiences with Interurban Car Axles

The Author Gives the Results of Experiments with Several Kinds of Steel—Wheel Fit Was Increased from 6 In. to 7 In. with Good Results

BY A. B. METCALFE

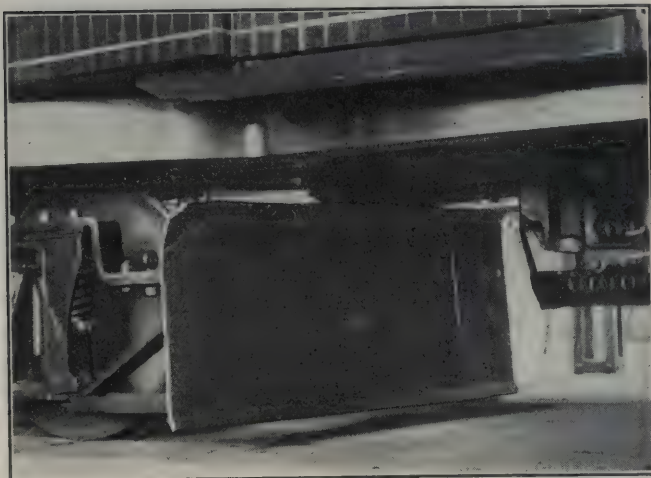
Master Mechanic Empire State Railroad Corporation, Syracuse, N. Y.

[NOTE.—In view of the present interest in improving the quality of car axles and knowing that the mechanical department of the former Beebe Lines had made extensive studies of the subject as related to interurban car operation, we asked Mr. Metcalfe, formerly connected with the Beebe System, to give our readers a brief summary of his observations. This article is the result.—EDITORS.]

ON the lines of the Beebe System, of which this railway formerly was a part, we tried out a number of different grades of material for car axles, with varying results. Until the last year or two all of our axle defects occurred at a point between the hub of the gear and the hub of the wheel on the gear end of the axle. On our equipments the gear was mounted close to the wheel. Recently, however, we have had some failures at a different part of the axle, namely, on the motor axle bearing seat. We have not as yet been able to determine the cause of this. At one time we thought that it was due to hot motor axle bearings, but we have had at least one case of breakage at this point without previously having had any hot axle bearings. Curiously enough, this occurred on a hard vanadium steel axle.

At one time we had about come to the conclusion that

(Concluded from page 93)



SHEET STEEL PILOT AND SNOW PLOW

respect to the track is very small, hence it can be set quite close to the track.

For classification markers on these cars two bull's-eyes are set into the letterboard just under the vestibule hood and lighted through colored glass slides. Between the lamp and the lens is a frame in which is a two-color slide by means of which the color can be changed very quickly.

These cars weigh, equipped, about 56,000 lb., and the seating capacity is sixty. The rattan-covered cross seats give the interior the appearance of an unusually long city car. There is no separation into general and smoking compartments.

mounting the axle gear on an extension of the wheel hub was the solution of the breakage problem, but this scheme proved to be impracticable in the case of rolled steel wheels on account of the expense of making the wheels. To test out the matter, however, we purchased some chrome nickel sleeves, on which the wheel and gear were pressed, and the sleeve was then pressed onto the axle. Bearing was provided, however, only for the length of the wheel hub, the sleeve being counterbored about 1/16 in. larger than the axle, under the gear. The idea was that the point of greatest stress in the axle would be inside the sleeve, and in the case of a break in service the longer piece of the axle holding the motor could not drop down because it would project 6 in. or more into the sleeve.

To prove that the use of this sleeve removed the danger resulting from an axle breaking in service, we cut an old axle into two pieces, the cut being about where they nearly always broke, and mounted the sleeve, gear and wheel on the short end. We ran a car equipped with this axle all around the shop tracks, curves and switches, and out on the road, the only indication that the axle was in two pieces being that on a quick acceleration the end on which the gear was mounted would spin, while the other end moved only as fast as the car. These sleeves are still in service and have given very high mileage, but the shop operations involved in applying them made their extensive use, we thought, impracticable. The sleeves, also, were expensive to make. One fine feature about them, however, was that we were never afraid to operate the axles fitted with these sleeves. Later to reinforce the axle at the weak point we increased the diameter of the wheel fit from 6 in. to 7 in. As the gear seat was originally 7 in., this made the axle 7 in. in diameter at the point where practically all the cracks had developed. None of the axles which have a 7-in. diameter wheel and gear fit has developed cracks at this point, which tends to prove that the previous axles were weak here. Cracks developed at the other end close to and inside the wheel hub.

When we first started operation the cars were equipped with open-hearth untreated steel axles, most of which developed cracks in the first 250,000 miles, but others are still in service. Some of these have made between 600,000 and 700,000 miles. Next we got some heat-treated carbon steel axles, but these were found at first to be too hard and gave trouble in less than 100,000 miles. Lower carbon steel was procured and has given very good service. We tried some low carbon and nickel steel axles, specially treated. These were very soft and the elastic limit low, and they gave very low mileage before developing defects requiring them to be discarded. The axles which have given the best results are of vanadium steel, with wheel and gear fit 1 in. larger in diameter than the main body of the axle.

Our method of inspection is to take a very fine cut with a sharp lathe tool over the section where the crack is liable to develop, and if the axle has the least crack in it the operator can see it with a naked eye. We had scrapped more than 200 axles from fifty cars in the last seven years. All of the cracks were discovered in the above-mentioned method of inspection. The cracks have varied in depth from 3/32 in. to 7/8 in. We believe that a test piece should be taken from each end of each axle made, and that a report of a test made by the manufacturer should be furnished to the customer.

Determining Stray Power of a Transmission Line

The Author Presents Data Taken in a Test on a 115-Mile Railway Transmission Line in the Middle West

By D. D. EWING

Associate Professor of Electric Railway Engineering,
Purdue University, Lafayette, Ind.

THE data presented in this article were taken in a test made under the writer's direction for the purpose of studying the operating conditions existing on the transmission line of the Fort Wayne & Northern Indiana Traction Company. This line extends from Fort Wayne to Lafayette, Ind., a distance of 115.4 miles, measured along the line. It connects the power plants of the company located at the two places. The system is three phase, with a line-to-line voltage of 33,000 and a frequency of 25 cycles. The line consists of three No. 2 B. & S., hard-drawn copper wires, arranged to form an equilateral triangle, and with a spacing which varies from 36 in. to 72 in. The average spacing was estimated to be 60 in. The wires are supported on pin insulators mounted on wood poles spaced 100 ft. apart. Some of the crossarms are of wood and some are of steel, the former predominating. Air-break sectionalizing switches are located at each of the ten railway sub-

TABLE GIVING LENGTHS OF LINE SECTIONS

Section	Length, Miles	Total Distance, Miles
1	9.50	9.50
2	8.71	18.21
3	10.66	28.87
4	11.03	39.90
5	11.28	51.18
6	12.52	63.70
7	11.56	75.26
8	14.12	89.38
9	8.82	98.20
10	17.20	115.40

stations. The lengths of the several sections between substations, starting at the Lafayette end, are as given in the accompanying table.

In the Lafayette station the high-tension lines are connected to the 370-volt buses through three step-up transformers having an aggregate capacity of 1125 kva., connected delta-delta. The measured ratio of transformation was 88.8. At Fort Wayne the transforming apparatus consists of two banks of transformers connected in parallel, each bank being of the same rating as those at Lafayette.

The measuring instruments were connected in on the low-tension side of the step-up transformers at the Lafayette power house. Power was measured by the two-wattmeter method. Voltage readings were taken for all three phases, and the current in two lines was measured.

Preparatory to making the test all transformers were disconnected and the line was sectionalized. With the step-up transformers at the Lafayette station connected to the busbars, readings were taken of power, current and voltage. The first section of the line was then connected to the high-tension side of the transformers, and readings were again taken. This process was repeated by connecting on section after section until the end of the line was reached. During the test the voltage at the generating station was maintained as nearly as possible at 370 volts.

The amperes per line, corrected and adjusted to 370 volts, are recorded in Fig. 1. The figure gives the

graphical average of the currents in the two lines in which meters were placed. The current shown by the graph as corresponding to a certain distance from the power station is not the current in the line at that point, but is the current input to a line of length indicated by the abscissa of the point. The current at zero length is the exciting current of the step-up transformers. The numerical value of this current is 68.3 amp., and, of course, has a large lagging component. As the sections of the line were connected on successively, the

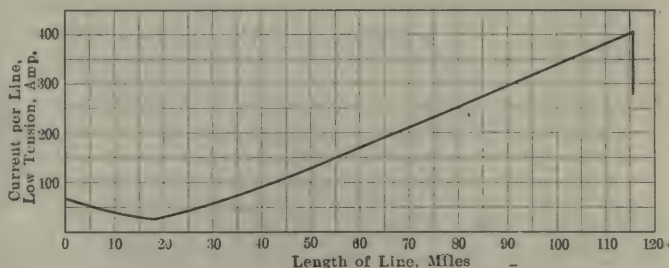


FIG. 1—RELATION BETWEEN LINE CURRENT AND LENGTH OF LINE

leading current—due to the electrostatic capacity of the line—neutralized the lagging component until a line-length was reached at which the power factor was unity. Beyond this point the current input increased rather rapidly, the power factor with the last section connected being 10.4 per cent leading. The drop shown at the end of the graph was occasioned by the exciting current of the Fort Wayne transformers when they were connected to the line with their low-tension windings on an open circuit.

The power readings, corrected for scale errors and phase-angle displacements, and adjusted to 370 volts, when plotted gave the straight line AC in Fig. 2. On the basis of constant loss in the step-up transformers the intercepts between the lines AC and AB are the leakage losses of lines corresponding in length to the abscissas at which the intercepts were taken. The input indicated by the point A is the no-load loss of the Lafayette transformers. At first thought it might seem that the line CD would represent the corresponding no-load

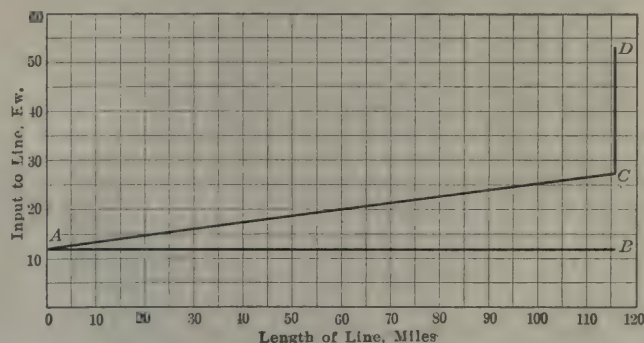


FIG. 2—RELATION BETWEEN POWER INPUT TO OPEN-ENDED LINE AND LINE LENGTH

input to the Fort Wayne transformers. It will be shown later, however, that this is not quite correct.

The assumption of constant transformer loss in drawing the line AB is not much in error, since any increase in losses must be due to copper losses. These, even with the whole line connected, will not be great, as the charging current of the line is only about 25 per cent of the current rating of the transformers. In this case the increase would be of the order of 0.6 kw.

The actual charging current for different lengths of

line can be found by subtracting vectorially the exciting current of the transformers from the current input to a given length of line. The graphical solution of this problem is illustrated by the vector diagram, Fig. 3. The vector *OO* is the exciting current of the transformers, and *O1*, *O2*, etc., are the current vector for lines of the several lengths. The vector differences between these vectors, *O1*, *O2*, etc., are the charging currents for the different lengths of line referred to the vector for the voltage of the Lafayette station. The horizontal projections of these vectors, *O'1'*, *O'2'*, etc., are the quadrature

as 0.864 ohm per mile. Using this resistance and the actual currents in the high-tension line for different line lengths, the ordinates for the copper-loss curve in Fig. 5 were computed. Subtracting this loss for a given line length from the corresponding intercept in Fig. 2 gave as remainder the line leakage loss for the given length of line. These losses were plotted to give the leakage-loss curve, Fig. 5, which represents the average of 0.106 kw. per mile for the entire line. This loss obviously is independent of any load on the line.

The copper losses in the line are not the same with

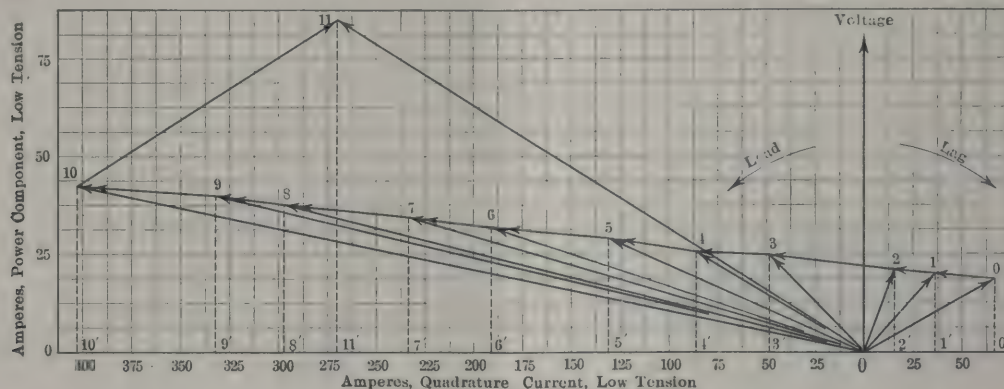


FIG. 3—VECTOR DIAGRAM FOR DETERMINING THE CHARGING CURRENT OF THE LINE

components of current for the several lengths. Vector *O-11* represents the current input with the Fort Wayne transformers connected, and a line drawn from 0 to 10 would be the vector for the current in the transmission line at Lafayette, expressed in terms of the low-tension current.

The actual charging currents, quadrature components, for different lengths of line are shown by dots in Fig. 4. For comparison, the upper line, giving the theoretical values, was drawn. Data for establishing this line were calculated from the standard formulas for line capacity, using the average spacing of 60 in. The theoretical value for the capacity current is 0.0437 amp. per mile of line. The lower line in the figure, which was drawn

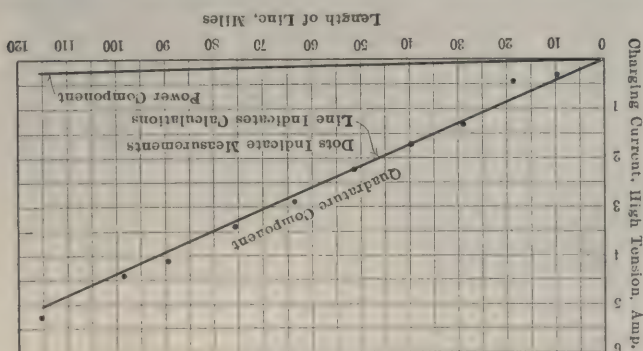


FIG. 4—COMPARISON BETWEEN ACTUAL AND CALCULATED CHARGING CURRENTS

through most of the points plotted, represents the actual power component. The actual line currents, of course, would be found by adding the two components at right angles. As a matter of fact, however, the power components are so small that the actual currents do not differ greatly from those indicated by the upper line in the figure.

The resistance of No. 2 B. & S. hard-drawn copper at ordinary temperatures is given by wire manufacturers

the line open-ended and with it closed on transformers. The quadrature current distribution along the line for the two conditions is illustrated in Fig. 6. With the line open-ended, the distribution, at least for the case in hand, will be very nearly as shown by the line *AB*; that is, at the station end the current will be a maximum, and will shade down to zero at the farther end of the line. With the farther end closed on transformers, however, a different condition prevails. The quadrature component of the exciting current of these transformers is represented by the distance *10'-11'*, Fig. 3, and has a calculated value of 132 amp. Transferred to high-tension terms, its value is 1.48 amp. To neutralize this lagging current requires 1.48 divided by 0.0437, or

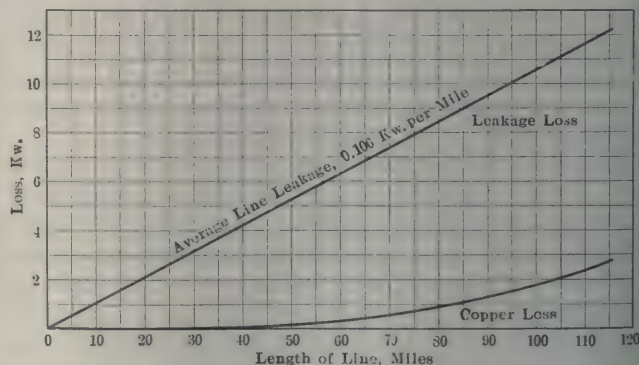


FIG. 5—SEGREGATION OF NO-LOAD LINE LOSSES

34 miles of line. This will result in a quadrature current distribution for the second case as indicated by the line *CDE*, Fig. 6. Therefore, the only current in the line at a distance of 81.4 miles from the station, is the power component necessary to supply the leakage and copper losses of the last 34 miles of line, plus the no-load losses of the transformers. This would be about $\frac{1}{2}$ amp.

For the entire line the copper loss calculated for the

first case is 2.75 kw., as shown in Fig. 5. With the distribution of current as in the second case the loss is only 1.06 kw. This decrease in copper loss means that the no-load losses of the Fort Wayne transformers, instead of being 26.4 kw., as indicated by the line *CD*, Fig. 2, are really 1.69 kw. (2.75 kw. minus 1.06 kw.) higher than this, giving a total of 28.1 kw. A check test made from the Fort Wayne end of the line gave results agreeing very closely with this figure.

As a matter of interest, it may be stated that with all substation transformers connected to the line, sec-

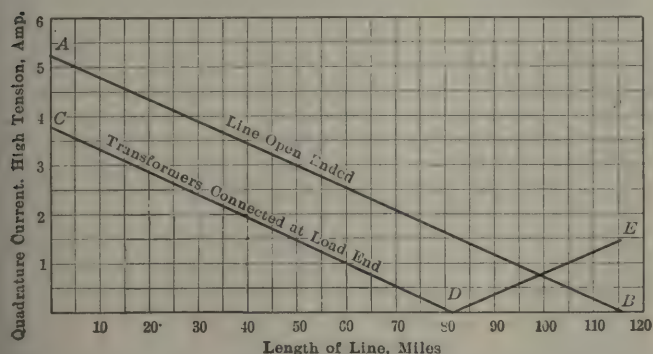


FIG. 6—DIAGRAM SHOWING QUADRATURE CURRENT IN THE LINE AT DIFFERENT POINTS

ondaries open, the input to the line was 90.3 kw. with a leading power factor of 0.90.

The author wishes to acknowledge his indebtedness to the Fort Wayne & Northern Indiana Traction Company, whose courtesy permitted the test, and to L. H. Junken, C. N. Iry, E. Pugh, and A. V. Stout, from whose graduation theses the data for the above curves were abstracted.

Coasting at Chicago

SINCE coasting recorders have been installed on the Chicago Elevated Railway, the *Safety Bulletin* published by that company states that records of power consumption show steadily increasing efficiency of the motormen. Some of the most efficient of the men say that they have found it easier to maintain schedule speed although they have coasted more.

One interesting fact brought out at Chicago is that the responsibility for wasted electrical energy should not be entirely placed upon the motorman, as he cannot keep up his schedule without the co-operation of the rest of the train crew. This was proved when a motorman who was found to be very efficient made a remarkably poor showing on a certain day and complained that the fault was due to the conductor, who kept the train tied up at the stations. A conductor who was young and full of "pep" was put on the following day and the coasting time of the motorman was greatly increased.

The coasting records taken on various lines, covering a period of one week, show a percentage of coasting ranging between 33 and 36.4 and a saving of power of 10.6 per cent. The coasting records of individual motormen show variations of 25 to 48 per cent. With a little more experience, this wide margin is expected to be cut down materially. These records are, of course, inconclusive, due to the short time that the recorders have been in service, but the Elevated officials are confident that the recorders will do all that was claimed for them.

Effects of Arc on Metal In and Around Electric Weld

By O. A. KENYON

Electrical Engineer Arc Welding Machine Company, Inc., New York City

THE writer was very much interested in tests reported in the issue of the *ELECTRIC RAILWAY JOURNAL* for Dec. 22, made at the works of the Westinghouse Company at East Pittsburgh, tending to show the effect of the arc on material adjacent to the weld.

Although I have taken an active interest in effects of this kind for a number of years, I was not aware that there was any belief current to the effect that material adjacent to the weld was injured by an arc of 60 volts. It is, however, generally admitted that it is possible to injure material that is deposited in the weld with an arc of 60 volts.

The effect of an arc upon the material adjacent to the weld is dependent upon all factors which determine the temperature of the metal at that point and the length of time that the metal is maintained at a high temperature.

Arcs connected in series with reactance produce a tremendous temperature rise at the moment of breaking the circuit, and it is arcs of this kind which possess the power to injure metal by the mere striking and breaking of the arc. It would be interesting to continue the investigations in series with which a reactor is connected, and also to include pieces in which the metal deposited in the weld is part of the test piece.

Undoubtedly metal deposited on the solid plate in the form of a patch changes the structure of the steel, as was evidenced by the decrease in elongation and reduction of area, as well as the increase in tensile strength. The writer has used this method for local heat treatment of welded joints, that is, by depositing a layer of metal on top of the weld after it is completed and then machining it off, with the result that the weld is stronger and the contraction stresses are practically eliminated.

Commissioners Indorse Fuel Saving but Take Little Formal Action

The various public service commissions of this country are standing ready to co-operate with the government in the saving of fuel, as far as they can be of any assistance. Only a few boards, however, have as yet taken any formal action in this matter. These facts have been brought out by a canvass, begun by the *ELECTRIC RAILWAY JOURNAL* immediately after Dr. Garfield as United States Fuel Administrator asked the commissions and electric railways to aid in eliminating wasteful uses of electricity. Previous articles, describing formal action taken by the Massachusetts, New Jersey and New York First District commissions appeared in the issues of Dec. 8 and Dec. 15.

In arranging a service flag to be hung in front of its place of business, the Kansas City (Mo.) Railways was confronted with the problem of providing a flag large enough to display properly the 200 stars that will appear in the center white field. By the time the flag is completed there will be approximately 212 stars, as that many men from the electric railways will be enrolled in the service of the government.

Basalt Blocks Make Good Headers in San Francisco

SEVERAL kinds of header blocks have been used on the San Francisco systems, but the United Railroads has chosen the basalt blocks as far superior to others and now uses them exclusively on all parts of the system. Basalt is quarried from the basaltic dikes of California. The four common varieties are gray, blue, brown and porous. The latter is not well suited for headers, and of the others, that having a blue color is the best. This stone if subjected to heavy truck traffic will develop occasional breaks in ten years, but the ultimate life is usually fifteen years. The basalt blocks now cost about \$55 per thousand.

The United Railroads has effected some saving where it was necessary to reconstruct the paving between rails in basalt block pavement. These blocks were replaced with asphalt pavement and the blocks were cut up into two or even three pieces suitable for headers at a cost of about \$10 to \$12 per thousand.

Brick headers have been extensively used in San Francisco, but under heavy traffic they break down quickly. On a thoroughfare where traffic is light an exceptionally good quality of brick put down in 1909 is still in service. Brick from the same source, however, and supposed to be of equal quality, which was put down later, has not given long life under any conditions and under heavy traffic is not expected to have a life of more than a few years. The paving brick available in San Francisco vary in price from local grades costing \$25 to \$30, up to \$46 to \$50 for the best grade shipped in from Puget Sound. The latter grade has been used extensively by the Municipal Railway and is considered satisfactory in residence districts or where the traffic is light.

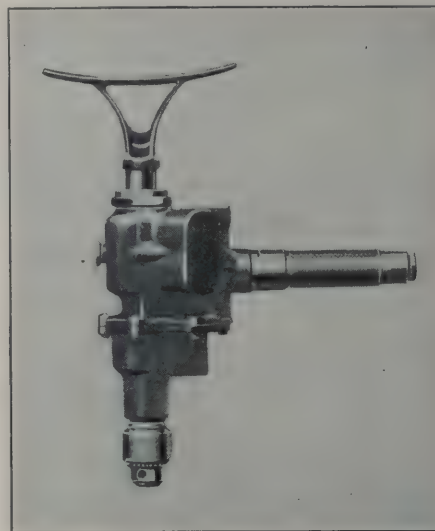
For a while Ohio wood from the Hawaiian Islands was used for headers. This is a very heavy wood with a very low absorption capacity and which will not buckle due to expansion. It therefore requires no creosote or other similar treatment. At one of the crossings where the traffic is very heavy, these blocks have been in service three years and show practically no wear. The Ohio blocks cost only \$25 per thousand, while they were available, and they were rated as the best material for headers. The manufacture of the blocks was discontinued, however, because other markets for the wood were found which offered greater profits. If other hardwoods could be procured from the tropics when facilities for water shipment are on a normal basis again, Pacific Coast electric railway operators would doubtless be much interested in their production.

Granite header blocks have been used to some extent and the California granite is regarded as wearing much better than brick but probably not as long as the best basalt. In removing the old granite wall from the site of the former City Hall it was decided to cut the stone up into header block sizes for the Municipal Railway. This is being done by stone masons entirely by hand work, at a cost of \$37.50 per thousand. About 50,000 are being made in this way.

The maximum load in the history of the Commonwealth Edison Company of Chicago occurred at 5 p.m. on Dec. 28 when the meters registered 410,910 kw.

A New "Little David" Drill for Light Work

THE Ingersoll-Rand Company has added to its line of "Little David" pneumatic tools a new lightweight, high-power, non-reversible drill especially adapted to that class of drilling and reaming work which may come within its capacity limits of reaming up to 5/16 in. and drilling up to 9/16 in. This new drill has been designated No. 5 "Little David." It weighs 15 lb. and develops a free spindle speed of 1000 r.p.m. With drill chuck its over-all length is 14⁵/₈ in. and the distance from the side of the drill to center of spindle is but 1¹/₂ in., which facilitates its operation in unhandy places. The spindle is threaded to accommo-



"LITTLE DAVID" PNEUMATIC DRILL FOR LIGHT WORK

date either a No. 1 M.T. socket or drill chuck, and these may be readily interchanged as desired.

The four-piston motor is very simple and the convenient accessibility of the reciprocating parts is pointed out to be of advantage. It is stated that the removal of five cap screws permits the crankshaft assembly to be withdrawn in its entirety. The valve is of the rotary type and is gear driven. Roller bearings are used on the connecting-rods and ball bearings on the crankshaft. The No. 5 "Little David" may be had with either breast plate spade handle or telescoping feed screw. In the latter case the length of feed measures

Twenty Sources of Fuel Waste

ATTRACTIVE posters emphasizing the necessity for saving fuel are being sent each week to all the Doherty properties. A very effective one pointed out the following potential sources of power waste:

1. Too many boilers in service.
2. Holes in the fire.
3. Fires too heavy.
4. Improperly banked boilers.
5. Too much fuel in the ashes.
6. Failure to operate boiler dampers.
7. Irregular steam pressure.
8. Safety valves blowing.
9. Air leaks in the boiler settings.
10. Scale in the tubes.
11. Soot on the tubes.
12. Leaky baffles.
13. Stokers or grates out of repair.
14. Leaky blow-off valves.
15. Steam leaks of any kind.
16. Dirty feed-water heater.
17. Bare steam pipes.
18. Low vacuum.
19. Turbine blading worn.
20. A dirty plant causes fuel waste.

Mechanical Problems in Design of Electric Locomotives

Tracking Qualities—Transmission of Power from Motor to Rail—Design of Motors—Further Development Possible

THE service requirements for steam and electric locomotives are very similar, so that many of the structural problems are common to both designs. There are, however, many problems which are quite dissimilar, due to the fact that electric instead of thermal energy is utilized in the electric locomotives. These points are well covered in an article by W. K. McAfee appearing in the January issue of the *Electric Journal*.

The mechanical problems in the design of the main structures and rotating parts of electric locomotives may be divided into the problems relative to tracking qualities, to the transmission of power from the motors to the rails and to the design of the motors themselves.

The tracking qualities depend upon the position and weight of the motors, the positions of the center of gravity in the vertical and horizontal planes, and the weight transfer. The position of the motor determines the type of drive, and this in turn largely determines the size, number and speed of the motors. A low center of gravity often makes a cheaper locomotive, but better running qualities are secured by a relatively high center of gravity. The important factor concerning the horizontal center of gravity is such disposition of masses with reference to center pins as to eliminate the tendency to swing at high speeds, causing distortion of track and possible derailment. The weight on the rear drivers is increased and that on the front drivers decreased when drawbar pull is exerted, but the tendency of the front wheels to slip is reduced by side rods. In the case of axle mounted motors the dead weight may produce undue stresses in the track structure, but articulated trucks eliminate part of this weight by transmitting it from truck to truck.

Relative to the transmission of power from motors to the rails, solid gear drive with axle suspended motors is used on street and interurban cars. The flexible gear is one of the most important for heavy service, as shocks due to sudden starting and track irregularities are eliminated. The quill type of drive is one solution for mounting motors on the trucks, as with this type vertical motion is permitted between motors and driving axles. Tracking qualities are bettered by mounting the motor higher and connecting to the driver by side rods, many different types of which have been developed.

One of the most important problems in the design of motors is the bearings. As the space taken by the bearings reduces the motor length and the output the most economical compromise is to concede enough length to the bearings to permit them to transmit the maximum power that the motor can economically deliver with the resulting length of core. Regenerative braking introduces another problem, as the bearing pressure is reversed without reversing the direction of rotation of motor. The main motor shafts must be capable of resisting strain due to sudden stopping or severe overload when the motors are directly connected to the drivers by means of side bars alone. If desired, yield may be introduced between the motor rotor and the

crank on the motor shaft by springs or by a friction clutch. Braces must be designed to withstand heavy stresses due to occasional short-circuit, and castings must fulfill all electrical and mechanical requirements and at the same time not be excessive in cost of pattern and molds. Forced ventilation of motors is becoming more generally used in cooling, the goal being to get maximum cooling with minimum of air, and maximum of air with minimum of power from the blower motor.

There is still an important field for development in the design of electric locomotives, one problem being to increase the drawbar pull without making an abnormally long locomotive.

Gasoline Rail Car de Luxe

THE accompanying photograph shows a very attractive gasoline rail car which has just been completed and is being used for demonstration purposes in the Sacramento Valley, California.

The car is all steel, built with the outside finish ribbed to resemble wood. Its weight is 14,000 lb., its length over all is 40 ft., its outside width is 7 ft. 6 in., and it has a passenger capacity of thirty-one. The arrangement of the floor plan, from front to rear end, is as follows: engine room, baggage room, smoking



GASOLINE CAR IN SACRAMENTO VALLEY, CALIFORNIA

room, entrance gates and vestibule on each side with lavatories in the center, parlor section with individual chairs and separated by full glass partition from observation platform at extreme rear end. The finish in white enamel with brown trimmings gives the car a de luxe appearance, so that it has attracted considerable attention. Electric starting and complete lighting current at 12 volts is supplied.

This car was built by the Commercial Cars Construction Company, San Francisco, Cal. The car has not as yet been in operation long enough to determine the operating cost data.

Good Record for Armature Bearings

The International Railway, Buffalo, N. Y., has been experimenting with a bronze armature bearing cast from a formula original with George Kuhn, master mechanic, which has given excellent results. At last report the bearing had made considerably more than 104,000 miles. It has been installed on four GE-74 motors, gear ratio 33 to 56. The motors are on an interurban car running on the high-speed line between Buffalo and Lockport. The company usually gets from 25,000 to 30,000 miles with a babbitted bearing.

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

Broadway Subway Opened

Local Service by B. R. T. on Line Between Rector and Forty-second Streets, Backbone of System

On Jan. 5, at about noon, New York City celebrated the opening of another new rapid transit line, namely, the Broadway subway in Manhattan, for operation by the New York Municipal Railway Corporation. The new operation consists of local service between Rector Street on the south and Forty-second Street, or Times Square, on the north.

For some time past the Broadway subway has been in operation between Canal and Fourteenth Streets in connection with trains from the Sea Beach line in Brooklyn, the trains passing over the Manhattan Bridge and the Canal Street subway to the Broadway line. The new service extends the 5-cent zone for Brooklyn travelers northward from Fourteenth Street, therefore, to Times Square, but for a while it will be necessary to change cars at Fourteenth Street. Eventually all the tracks of the Broadway subway, which is a four-tracked line, will be placed in service, and then both local and express trains will traverse the whole length of the line.

HOW LINE WILL OPERATE FINALLY

When the line is placed in operation in its entirety it will run from the Battery northerly through Church Street, Broadway and Seventh Avenue to Fifty-ninth Street, thence easterly under Fifty-ninth Street and the East River to a connection with the new rapid transit lines in Queens Borough. On the southern end there will be a tunnel to Brooklyn connecting with the Fourth Avenue subway, and connection is also made with that line through Canal Street and over the Manhattan Bridge.

The construction of the Broadway subway, Manhattan, was first proposed in 1911 as a means of relieving transportation conditions in that section of Manhattan south of Fifty-ninth Street, and as a distributing line through the heart of Manhattan for the people of Brooklyn and Queens. The proposal was made by the Brooklyn Rapid Transit Company. Two full years of discussion and planning followed before an agreement was finally reached and the plan ratified. Construction was begun, however, before the contract was executed, and the city has been building the subway for about six years. Two tracks have been placed in operation between Whitehall Street and Forty-second Street. It will be some time before all four tracks will be ready for express and local service, and before connections will be made with Brooklyn

and Queens via the tunnels at the Battery and at Sixtieth Street respectively.

In a pamphlet which it prepared for distribution among its patrons the company said:

"For intermediate imperfections of service the operating company begs the indulgence of its patrons. The limitations at terminals will temporarily restrict the number of trains to be operated, and the other evidences of incompleteness will produce some complaint and inconvenience. But both the Public Service Commission and the operating company feel that it is better to begin operation with facilities as they are than to wait until the work is entirely finished."

Brooklyn subway trains now operated to Union Square via Manhattan Bridge and Canal Street will continue to be thus operated, but will use the express tracks between Canal Street and Union Square, with intervening stops. Change may be made there for local subway trains to Forty-second Street and vice versa.

Severe Storm in West

The severe blizzard which swept over the Central Western states on Sunday, Jan. 6, paralyzed street railway and interurban traffic. City service in Chicago was demoralized and hundreds of residents were compelled to remain in downtown hotels Sunday night because of their inability to get home. In the Calumet region conditions were worse than in Chicago proper. Pullman, Indiana Harbor, Gary and Hammond were left practically without railroad communication. In some cities of Illinois and Iowa electric railway and interurban systems were unable to move any cars after 5 p. m.

Hundreds of soldiers from Camp Grant, near Rockford, Ill., were caught in the city of Rockford and were unable to return to their cantonment. Finally about 150 of them appealed to W. C. Sparks, general manager of the Rockford City Traction Company, who ordered two interurban cars, equipped with snow sweepers, to make the trip to Camp Grant. More than two hours were required for this trip of about 5 miles. Joliet, Ill., was also hard hit by the storm and while city railway traffic was maintained, the interurban service in and out of Joliet was very infrequent. Plainfield, Ill., a village 10 miles north of Joliet, was completely isolated by the storm. Several cars were almost buried in the snow in a deep cut between Joliet and Plainfield. By Monday morning, Jan. 7, however, most of the railway companies were able to resume normal service.

State Directors Urged

Speaker Cox of Massachusetts House of Representatives Declares Against Public Ownership of Railways

Public ownership of electric railways was condemned by Speaker Channing Cox of the House of Representatives of Massachusetts in his inaugural address at the opening of the 1918 Legislative session. He impressed upon the House the necessity of action to relieve the electric railways of their financial burdens and argued strongly for "intelligent State supervision with State directors," as the solution of the present problem. The Speaker's reference to the electric railway situation was the most important feature of his address. In this connection he said:

"The people of the commonwealth are dependent upon the continuance of the electric railway systems. Our future prosperity, our comfort, our convenience, require not only a continuance but indeed an improvement of such service. One by one the electric railways are showing their inability to continue under present conditions. This is true of railways in cities and of those in rural communities. The money honestly invested in these railways represents in part the savings of the toilers. I hope that Massachusetts will always deserve a reputation of dealing honorably with those who have loaned their savings to build up our industries and to develop our commercial life, but the question is bigger and beyond fair treatment to investors. It is a question of continuance of railway service and development and improvement. The issue is between progress and something worse than stagnation—retrogression.

SOMETHING MUST BE DONE

"Obviously the Commonwealth could take over the electric railways, paying therefor a fair value, and then operate them. I have little doubt that the owners of stock in Massachusetts electric railways would welcome such a step. But I hope the day is far distant when Government ownership and operation of electric railways will be necessary in Massachusetts. I cannot believe that the most efficient and economical conduct of our electric railways lies in that direction.

SOLUTION NOT IMPOSSIBLE

"With strong and intelligent State supervision, with State directors, the cost of electric railway construction and operation plus a fair return on the honest capital invested can be determined. On that basis a proper and sufficient charge for service can be fixed by State authority. The public is

Views of Massachusetts Board

Chairman Macleod of Massachusetts Public Service Commission Questioned on Electric Railway Problems

Frederick J. Macleod, chairman of the Public Service Commission of Massachusetts, appeared recently before the legislative street railway investigating commission at Boston and submitted to an extended series of questions regarding the views of the board on the electric railway situation in general. Mr. Macleod said that there were companies where there was no reasonable outlook that the road could put itself in a sound financial condition by any fares which it was possible to impose. In other words, higher fares would discourage riding to a point where the net results might be less advantageous to the companies than the lower rates. Under such conditions the company ought to be permitted to abandon the service if it found that it was not earning operating expenses. On the other hand, if the communities affected believed that the service was of vital importance, some provision ought to be available by which part of the continued operation of the company should rest with the community served. He then cited the case of the Providence & Fall River Street Railway which would not stay abandoned.

ASSESSMENT MATTER ABANDONED

The question was raised whether the Massachusetts commission had ever considered the wisdom of assessing betterments on abutters where there were extensions of rapid transit lines. Mr. Macleod said the commission had suggested, in connection with the Boston Elevated investigation of a year ago, such a system, but that the subject was complex and that no detailed plan had been prepared. When Peter Witt appeared at the Bay State rate hearings before the board, representing the remonstrants in that case, he expressed himself very strongly in favor of the application of that principle, and in the city of Cleveland when certain communities were being built up and a certain number of real estate operators were very anxious to get street railway service extended into this new territory, Mr. Witt, as street railway commissioner of Cleveland, insisted upon securing special contributions from the real estate owners on those lines before they were put into operation.

Mr. Macleod said that the situation of Massachusetts electric railways reflected in general electric railway conditions all over the country, Repre-

sentative Hays asked Mr. Macleod whether he thought that it was a part of the duties of the commission if it saw a road going down financially to advocate higher fares. Mr. Macleod did not know whether the commission had the authority to do that under the law. The Interstate Commerce Commission did not have the authority to deal with the matter in that way. He said: "So far as the necessity of increase in fares is concerned, if it was just that larger and higher fares should be charged in order to provide proper service for the communities and to keep the electric railways going, in so far as I am personally concerned, I would have no hesitation whatever in saying that such increases were necessary in the general interest."

CARING FOR DEPRECIATION

The Massachusetts commission in certain fare cases had indicated that the company should provide depreciation on a scale that had been indicated. Under the form of the return which the commission had prescribed the company must report some reserve for depreciation on electric railway equipment, but there had been no requirement for larger depreciation reserve for maintenance of ways and structures, and the Massachusetts Board had followed practically the same course as the Interstate Commerce Commission in that respect, and had urged the company to lay aside and had required it to lay aside some reserve for depreciation. But the commission had not attempted to indicate any definite amount which ought to be set aside by any company. Laying aside a depreciation fund was possible only if the revenue of a company was sufficient. The question of rates and the question of laying aside a proper depreciation fund were inextricably bound together. The commission had ample power to handle this matter, in the opinion of the chairman, who said that if that power had not been exercised it was due to the fact that the commission as a matter of discretion did not believe that under the present financial condition of the companies it should attempt to make specific requirements for depreciation except in so far as the board was able to deal with companies in cases where increased fares were given.

IMPROVING RAILWAY CREDIT

The commission had attempted to make better credit for electric railways by taking action in giving the companies increases in fares to which they were entitled, by recommending the elimination or changing of certain forms of taxation and suggestions in regard to the regulations of jitneys.

The commission had reversed itself on the one-man car question, but considered itself in good company in that respect in view of the early lack of advocacy of this type of rolling stock dis-

played by Massachusetts companies. Chairman Macleod said that whereas the carmen's unions were opposed to the introduction of one-man cars at the outset, he thought that employees of operating companies now held a different view, having a better appreciation of the advantages of such cars to the employees themselves, as well as to the companies and the public. In the one-man car matter the commission gave very full and careful consideration to the objections raised by the employees and the commission believed that these objections were not controlling and permitted the companies to make the experiment.

Railway Hit

P. R. T. Protests Against Proposed Power Rate Increase of Philadelphia Electric Company

Ellis Ames Ballard, chief counsel for the Philadelphia (Pa.) Rapid Transit Company, has filed a complaint with the Public Service Commission against the advances in rates for electrical energy proposed by the Philadelphia Electric Company. According to this complaint, the Philadelphia Rapid Transit Company has contracts with the Philadelphia Electric and its subsidiaries, the Delaware County Electric and the Beacon Light Companies, for a supply of current to operate trolley lines. Originally the contracts were made for a term of ten years, and, according to Mr. Ballard, they still have five years to run.

CHARGES CONTRACT VIOLATION

It is charged in the complaint that the schedules of increased rates asked for by the Philadelphia Electric and its subsidiaries are in violation of these contracts. The petition also sets forth that the increased rates may necessitate an advance in fares. Mr. Ballard is quoted as stating:

"We are contesting the right of the Philadelphia Electric Company, first, to abrogate its contracts with us without notice, and, secondly, the method of breaking the contracts. I have not the exact figures of the railway's annual electric current bill at hand, but the sum is considerable. With other expenses of operation increasing, naturally there must be some increase of revenue if the electric power rate is to be increased. We have ten-year contracts with the electric company that still have five years to run. The rate in those contracts was fixed by the electric company. They were good contracts for five years, but now that the shoe is beginning to pinch they want an increase, and we have protested against it."

Individual consumers will not be affected by the increases, the petition of the electric company exempting municipal and residential bills. Appeal is made for an increase of 20 per cent in the surtaxes on all classes of power current. The increase will apply upon \$9,000,000 of revenue out of a total gross revenue for 1917 of \$11,700,000.

(Concluded from page 100)

reasonable. The public wants to pay the honest and necessary cost of service rendered. If we address ourselves to this problem with the public good singly in mind we can find a solution, difficult though it may be. It may not enhance our own personal political fortunes but that consideration ought to be of no moment compared to the satisfaction of doing right."

Director General of Railroads Not Planning to Take Over Electric Lines

Measure Now Pending in Congress Likely to Result in a Law That Will Clear the "Twilight Zone"

Reports published in various newspapers that William G. McAdoo, director-general of railroads, has issued orders for placing certain electric railroads under Government control are not borne out by inquiries made at Mr. McAdoo's office by the Washington correspondent of the **ELECTRIC RAILWAY JOURNAL**. There is no record at the director-general's office of an order placing the lines of the Lehigh Valley Transit Company under Government control, according to official statements made in Washington, and the director-general, it is stated, is not contemplating any similar move in regard to those or any other lines, at this time.

One of the most important reasons why no such step is now under consideration is the fact that the administration railroad bill, designed to carry out provisions of President Wilson's recommendations to Congress in regard to transportation systems, is now before Congressional committees. Until Congress acts, it is stated at the office of the director-general, there will be no move which members might consider an invasion of their all-powerful rights, or which, to say the least, might be considered not in the best taste on the part of an executive official of the Govern-

ment. Government executives rarely if ever take action on matters being considered by Congress. This custom applies even to the President of the United States.

It is pointed out in Washington that the proclamation of the President taking control of the railroads of the country, and making allusion to the possibility of eventually taking over certain electric railways engaged in interstate commerce, was issued while Congress was in recess. Since that time the President has made a number of recommendations to Congress in regard to the railroads, and it is expected that Congress will bring forth a law which will take many questions out of the "twilight zone."

On the other hand, it is recognized in administration and executive circles in Washington that the time may come when it will be desirable from a Government point of view to take over certain electric railways serving works of important manufacturers of munitions and engaged in interstate commerce. Surveys of such fields and possibilities by the officials attached to the staff of the director-general of railroads are being made, in a tentative manner, for the sake of gathering information.

Philadelphia Transit Lease Signed

Both Branches of Councils Pass Measure for Development and Operation of High-Speed Lines

The Select Council of Philadelphia, Pa., on Jan. 3 concurred with the Common Council and passed without debate the ordinance authorizing the lease of the city's high-speed transit facilities, when and as built, to the Philadelphia Rapid Transit Company. The bill was approved immediately by the Mayor. Only the formality of confirmation by the stockholders of the company and the sanction of the Public Service Commission are necessary to complete the compact.

PROVISIONS OF LEASE

The principal provisions of the lease are:

Payments to the city and company, in proportion to the relative investment of each, equal to a 5 per cent dividend.

Eight-cent exchange tickets to be abolished outside of the delivery district in the central part of the city within sixty days after the signing of the lease, and universal free transfers to be substituted therefor.

On the opening of the Frankford line, exchange tickets to be abolished inside the delivery loop and free transfers substituted therefor.

Fares to be revised upward or downward, according to the amount of the gross revenue and the fixed demands on that fund.

Broad Street subway, from League Island to Olney Avenue.

Frankford line, from Front and Arch to Rhawn Street.

Bustleton and Byberry surface line. Darby line, from Thirtieth and Market Streets to Darby.

Parkway subway, from City Hall to Fairmount Park, connecting with an elevated line to Roxborough.

Delivery loop-subway in Arch, Eighth and Locust Streets, connecting with the Broad Street subway.

Chestnut Street subway, as a possible connection between the Frankford and Darby elevated lines.

One of the features of the proposed lease is a board of supervising engineers, which will have control over the operations of the unified system. Through an amendment to the lease, made before its passage by Common Council, the director of city transit will be a member of this board. The company will name a member and it is assumed that one of the transit company's chief engineers will be chosen. The third member will be named by agreement of the city and the company.

The next step is the signing of the lease by Thomas E. Mitten, president of the Rapid Transit Company. He cannot affix his signature for a month, for the reason that the proposition must be advertised to the stockholders

for thirty days and then a meeting of the stockholders will be held. Finally, the lease will be submitted to the Public Service Commission for its approval.

Trenton Tax Case Appealed

Frank S. Katzenbach, Jr., counsel for the Trenton & Mercer County Traction Corporation, Trenton, N. J., has filed in the Supreme Court reasons why the court should reverse the decision of the State Board of Taxes and Assessments sustaining the assessment of the Mercer County Tax Board on the company's property in 1916. One of the reasons is that the going value of the property, as defined by the State Tax Board, is not taxable under the laws of New Jersey.

M. O. Bill in Rhode Island

An act has been introduced in the House of Representatives of Rhode Island by Mr. Kiernan, creating a commission of three men to draw up and present as soon as possible, such legislation as would be necessary and desirable to enable the State to take over, run and own, all of the electric railways in Rhode Island. The measure has been referred to the judiciary committee for consideration.

Editors Praise Mr. Dempsey

Brooklyn Papers Are Agreed that Wise Choice Was Made in Electing Him Vice-President

The election of J. J. Dempsey as a vice-president of the Brooklyn (N. Y.) Rapid Transit Company, announced in the **ELECTRIC RAILWAY JOURNAL** for Dec. 29, was promptly recognized by the Brooklyn papers as a just reward for ability displayed previously. Many complimentary things were said by them editorially of Mr. Dempsey in commenting on the changes in the personnel of the company. The *Standard Union* said:

"Mr. Dempsey's career has been brilliant. There can be only one explanation of a rapid rise like this. Mr. Dempsey, of course, is a technical expert of the first rank. In addition to that, he possesses personal qualities that enable him to obtain results from a large working force, under insistent demands for good quality of service from an exacting public. The Brooklyn transit directors do well to give such a man as Mr. Dempsey the widest field for the exercise of his powers. The war, with its draft of man power and curtailment of material resources, brings serious problems to the B. R. T. The system is to be congratulated on its success in producing a man from the ranks capable of approaching the highest places."

The *Times* said:

"It was eminently wise of the directors to elect Mr. Dempsey vice-president of the company, because, unless it be Colonel Williams, who has been with the railroad system since he was the secretary of Gov. Roswell P. Flower, no

man in Brooklyn knows the borough transportation problem like Mr. Dempsey, and none in the country surpasses him in the field of operative management. We regard it as a good fortune to the community that his merit has been so signally recognized by the representatives of the owning interest."

News Notes

Street Railroad Department Established.—On Jan. 3 the office of the City Street Railroad Commissioner of Cincinnati, Ohio, was abolished and the Department of Street Railroads, administered by the Director of Street Railroads, was established in accordance with the new city charter. Mayor John Galvin has appointed W. C. Culkins to the new position, the duties and authority of which are described in the new city charter and the new franchise ordinance of the Cincinnati Traction Company.

Expense of the Toledo Street Railway Commission.—In replying to a request from Councilman Frank Miller, Mayor Milroy made the following statement to the City Council of Toledo, Ohio, on Dec. 31: "There is no moral or legal obligation on the city to pay for any service of the commission. The commission, of course, must pay for its legal counsel and for its office room. There was a public spirited citizen who offered to pay this expense. If the commission reports an electric-railway plan suitable to the voters of Toledo, then I think there would be a moral debt to the commission. No expense could be charged to the city without the consent of the people by vote."

New Franchise for East Cleveland.—A managerial form of government went into effect in East Cleveland, Ohio, on Jan. 1, with C. M. Osborn at the helm. Mr. Osborn is an engineer. He has had long experience in municipal affairs. Under him negotiations will be taken up with the Cleveland Railway for a new franchise covering both the Euclid Avenue and Hayden Avenue lines. The franchise on the latter expired last April, but that on Euclid Avenue runs to February, 1921, with the same fare as prevails in Cleveland. At the present time cars are being operated on Hayden Avenue under a temporary contract at a fare of 5 cents. Citizens of East Cleveland want a blanket contract.

Association Meeting Program

Illinois Electric Railways Association

It is expected that the Illinois Electric Railways Association will hold a convention at Chicago some time the latter part of January. A program is being arranged and it is possible that the meeting will be held on Jan. 26.

Financial and Corporate

Oakland, Antioch & Eastern Reorganization Plan Filed

San Francisco, Oakland & Sacramento Railway, the Proposed Successor Company, Will Have \$8,500,000 of Stocks and Bonds Outstanding

A plan for the permanent financing of the Oakland & Antioch Railway, the Oakland, Antioch & Eastern Railway and the San Ramon Valley Railroad has been adopted by the committee representing the holders of the bonds of the companies and is about to be submitted to security holders. The submission of the plan at this time is pursuant to the order of the California Railroad Commission made in 1915, providing that one be submitted for its approval before the beginning of 1918.

The details of the plan were made public in the following official announcement:

DETAILS OF PLAN

"The Railroad Commission in a decision rendered in November, 1915, provided that a plan for the permanent refinancing should be submitted to it on or before Jan. 1, 1918.

"Pursuant to this mandate, the bondholders' committee of said roads, consisting of S. Bachman, Fred H. Beaver, A. Christeson, C. Osgood Hooker, John Lawson, Jesse W. Lilienthal, Paul A. Sinsheimer and Sydney M. van Wyck, Jr., proceeded to a careful consideration of the finances of the roads and, after many months of deliberation, is about to submit to the security holders the following plan:

NEW NAME FOR COMPANY

"A new company will be organized to take over the properties of the old companies. For the time being, the name San Francisco, Oakland & Sacramento Railway has been tentatively adopted.

"The new company will be authorized to issue the following securities:

"1. \$3,000,000 par value of twenty-year first mortgage 5½ per cent bonds.

"2. \$1,500,000 par value of 6 per cent preferred stock, consisting of 15,000 shares of a par value of \$100 each. Preferred stock will be non-assessable and will be callable at any time at 110.

"3. \$4,000,000 par value of common stock consisting of 40,000 shares of a par value of \$100 each. The common stock is to be non-assessable.

"The amount of the securities so authorized which the new company is to put out for purposes of reorganization is as follows:

"1. Twenty-year first mortgage 5½ per cent gold bonds. Not to exceed \$1,950,000 of the par value of these bonds is to be issued or set aside for the purpose of carrying out the reorganization plan. The balance of the bonds, to wit, \$1,050,000 par value, will

remain in the treasury to be issued only under stringent restrictions.

"2. Preferred Stock—Not to exceed 13,300 shares of this stock will be issued for reorganization purposes. The balance, to wit, 1700 shares, is to remain in the treasury.

"3. Common Stock—All of the common stock is to be issued.

"These securities of the new company are to be distributed among the bondholders of the companies and among persons holding bonds in pledge, so that they will receive securities of a par value equal to the par value of the securities now held by them upon the following basis: Twenty per cent bonds, 20 per cent preferred stock, 60 per cent common stock.

"Secured creditors are to be treated in accordance with the securities held by them and common stock remaining in the treasury after distribution to bondholders and holders of bonds in pledge is to be divided among the unsecured creditors."

Receiver Asked in St. Louis

Stockholder Begins Suit to Protect Equity, but Complaint Is Said to Disclose No Cause for Action

On Jan. 7 suit was begun in the United States District Court in St. Louis, Mo., for the appointment of a receiver for the United Railways of St. Louis. The petition made by the attorney for a New York holder of a small amount of preferred stock, is said to be for the purpose of preserving the equities of shareholders and securing certain restitutions from old directors.

Judge Dyer on Jan. 10 refused to issue a temporary order appointing a receiver for the company, and made subpoenas returnable in ten days. At that time the company can either file an answer or a motion to dismiss the proceedings.

The petition asserts that the company is solvent, but that money has been needlessly expended under power contracts made by directors in 1908 and in mill-tax litigation. Restitution of such money is demanded. Furthermore, it is alleged that if the pending resettlement franchise falls through the company may be forced into receivership in the interest of creditors and that this might mean disintegration of the property.

James D. Mortimer, president North American Company, which controls the United Railways, has issued the following statement:

"From a reading of the complaint it

does not appear to disclose a cause of action. The matters complained of are well known to the St. Louis public and have been explained at considerable length, so that they now know all the essential facts. The plaintiff, however, evidently remains unconvinced that the contracts under which the railway is purchasing electric power for the operation of a portion of its system are advantageous to it. Without the power so purchased the railway could operate only one-third of the number of cars it now runs regularly during rush hours, and it could not engage a new power supply at rates nearly as low as those now paid. The accomplishment of the plaintiff's purpose would be most disadvantageous to the company and the public it serves."

Several protective committees have previously been appointed in the interests of bondholders, but no interest has been defaulted on the company's indebtedness. The Board of Aldermen, as noted from time to time in these pages, has under consideration plans for a resettlement of the franchises under which the company operates.

Abandonment Prevented

Kentucky Court Says Company Must First Prove That It Cannot Operate Except at a Loss

The Southern Traction Company, Bowling Green, Ky., will not be permitted to carry out its plan of selling its property to be scrapped for junk, for the Kentucky Court of Appeals has affirmed the finding of the lower court. Meanwhile differences between the railway and the company from which it purchased power have been composed, a suit for receivership brought by the city and county has been filed away and service resumed. Under the decisions of the courts the railway will be required to show that it is losing money before it can scrap its lines and discontinue service. The Court of Appeals said:

HOW THE COURT DECIDED

"We do not consider or determine the question whether under any circumstances an electric railway that has obtained a franchise may, in opposition to the will of the municipality from which the franchise was obtained, abandon its line of road and remove its rails, poles, cars and other equipment, but we are agreed that in any event before a common carrier should be permitted to do this it should be made plain that it cannot operate except at a loss."

The Court of Appeals concurred in the opinion of the lower court, which held that if the bondholders and stockholders, who are identical, do not desire a foreclosure and a sale to determine whether a purchaser can be had, they must continue operating. If they fail it might become proper and necessary for the court to take control through a receiver and operate the property until it could be ascertained whether it could be continued as a going concern.

Better Outlook for Petaluma & Santa Rosa Line

Despite Strike and Passenger Traffic Loss, \$150,000 of Floating Debt Was Paid by the Company in 1916

Conditions more nearly normal existed in 1916 in the territory served by the Petaluma & Santa Rosa Railway, Petaluma, Cal., as far as the income from production was concerned. The prices prevailing were high enough to offset a shortage in production. This enabled the producers to recover partially from the losses suffered in the two years previous and generally improved business conditions in the territory, with a natural indirect effect on the earnings of the railway. The decrease in the amount of production of many commodities, however, made a corresponding decrease in tonnage for the railway without any direct benefit from the high prices obtaining.

	1916	1915
Gross earnings	\$273,534.19	\$283,047.63
Operating exp.	196,885.61	201,150.07
Surplus	\$15,046.05	\$19,534.05
Net earnings	\$76,648.58	\$81,897.56
Fixed charges	61,602.53	62,362.99
Railway passengers	619,729	691,611
Steamer passengers	2,826	6,020
Railway freight (tons)	67,987	64,061
Steamer freight (tons)	89,464	87,615

Note—Operation was charged in 1916 with \$10,934 on account of depreciation and compensation insurance, while no charge was made for these items in previous years.

Both steamers of the company were tied up between June 1 and July 20, at the busiest time of the year, on account of a general strike of bay and river steamboat firemen and deckhands. The company maintained its service during the strike, practically without interruption and without any appreciable loss of patronage, and resumed the operation of its steamers without paying any increase in wages. While the entire decrease of \$9,500 in gross earnings is probably attributable to the strike, the company suffered practically no net loss on account of it.

The reduction in operating expenses for the year amounted to \$15,200, as shown by the accompanying comparative statement of earnings and expenses, with charges for depreciation and compensation insurance deducted in 1916 and not in previous years. About \$8,500 of this amount is accounted for by the elimination of the expense of operating the steamers during the strike.

The passenger earnings decreased \$8,692 for the year. The decrease in 1915 was over \$10,000. Up to 1915 the passenger earnings show a consistent increase, and it is difficult to satisfactorily account for such a marked decrease in such a short time. There are several conditions which have probably contributed to it, the principal one being the increase in the use of automobiles, a great number having been sold throughout the territory during 1915 and 1916.

Notwithstanding the decrease in pas-

senger earnings and the strike of the steamer deckhands and firemen, \$15,000 was paid on the company's floating debt during the year. The amount of cash available for meeting current obligations was about \$3,000 more at the close of the year than at the close of 1915.

As to the outlook, the annual report states that there seems to be no reason to doubt that the earnings will easily meet operating expenses and fixed charges in 1917. Under normal conditions and any reasonable increase in rates, which will be applied for, a substantial increase in the surplus should be realized.

Municipal Railway Earned \$7,000,000 in Five Years

The San Francisco (Cal.) Municipal Railway system has earned \$7,039,999 since the beginning of operations, according to a statement issued recently by the Board of Public Works. On Dec. 28, 1917, the road had been in operation five years. The statement which has been made public is only inclusive of October.

Of the \$7,039,999 earned there have been disbursements amounting to \$5,193,084, with the balance in the depreciation and various other funds. Of the depreciation fund \$547,643 has been invested in bonds and there is a cash credit of \$533,803. Of this amount contracts for future extensions totaling \$454,857 have been pledged by the Board of Supervisors, leaving the actual cash balance of \$78,946 in the Municipal Street Railway fund.

New Toledo Bonds Offer to Pay Normal Income Tax

On Jan. 7 Harris, Forbes & Company and the National City Company, New York, N. Y., announced a public offering of \$10,500,000 of two-year 7 per cent coupon bonds of the Toledo Traction, Light & Power Company, Toledo, Ohio, at 98½ and interest to yield 7.82 per cent. The bonds are a first lien and secured through deposit of securities, on the electric light and power and street railway business of Toledo. Earnings of the controlled operating properties at present are more than double the interest charges on the new bonds.

With respect to tax provisions, the company agrees to pay any normal federal income tax which it may lawfully pay at the source to an amount not exceeding 4 per cent. The company also agrees to refund, through the Pennsylvania Company for Insurance on Lives & Granting Annuities, Philadelphia, the Pennsylvania 4 mills tax to holders of these bonds residing in that State.

Five years ago the Toledo Traction, Light & Power Company sold \$7,500,000 five-year 6 per cent first lien collateral

bonds due on Feb. 1 next. The bonds were sold at 100 and interest to yield 6 per cent. The new bonds to take their place will yield more than 1 per cent additional and at the same time be secured by collateral \$4,000,000 in excess of the collateral that has secured the five-year 6 per cent bonds. In addition to the \$7,500,000 bonds to be taken up there will be some additional bonds, making \$8,699,000 maturing bonds that will be retired.

Utility Issues Investment Booklet

Utility properties managed by H. M. Byllesby & Company, Chicago, Ill., are distributing a sixteen-page investment booklet to 200,000 electric and gas customers. The booklet points out the difference between speculation and investment and describes the advantages of the preferred stocks of successful utility organizations. The title is "The Straight Road to Financial Independence." It was written by W. H. Hodge, manager of the publicity department of H. M. Byllesby & Company.

Financial News Notes

Mount Vernon (Ill.) Line Wrecked.

—According to official information just now available, the City Railway, Mount Vernon, Ill., was wrecked and sold by the receiver in 1917. The Hyman-Michals Company, Chicago, purchased the material.

Receiver for Abilene.—W. G. Swenson was appointed near the end of 1917 as receiver for the Abilene (Tex.) Street Railway. This action was taken on the petition of bondholders. The outstanding capital stock of the company is \$25,000, and the funded debt \$30,000.

Receiver for Defunct Line.—A receiver was appointed late in 1917 for the St. Louis, Lakewood & Grant Park Railroad, St. Louis, Mo. This line has not been in operation since the floods of 1915. A receiver was sought by the bondholders in order to sell whatever property still remains.

Sacramento Line Abandoned.—The property of the Sacramento Valley Electric Railway, Dixon, Cal., was sold at foreclosure in 1917, without the appointment of a receiver, and the line was abandoned. The right-of-way, roadbed, bridges, fences and ballast for 12 miles of track are for sale.

Chicago City Dividend Action.—The trustees of the Chicago City & Connecting Railways have declared a semi-annual dividend of 1½ per cent on the preferred stock, which makes the total declaration 3 per cent for the twelve months' period. It has also been voted to retire \$250,000 of the 5 per cent bonds and pay \$50,000 of floating debt.

Satisfactory Adjustment Made.—The Chickasha (Okla.) Street Railway has made a satisfactory adjustment with the State Board of Equalization to secure a fair valuation of the property. Some time ago the ELECTRIC RAILWAY JOURNAL published an item to the effect that this company intended to suspend operation unless such an adjustment was made.

Missouri Company Voluntarily Stops Operation.—The owners of the Mexico Investment & Construction Company, Mexico, Mo., late in 1917 decided to abandon operation of the property, after a voluntary petition for permission to cease operation because of its unprofitableness. Dismantlement was to begin at once, and the material was to be offered for sale.

Waycross Property Being Scrapped.—The foreclosed property of the Waycross Street & Suburban Railway was resold late in 1917 to the Southern Equipment Company, Atlanta, Ga., for \$30,000, and dismantlement was begun. The foreclosure sale of the property to the Waycross Savings & Trust Company was noted in the ELECTRIC RAILWAY JOURNAL of June 23.

Receiver's Certificates for the Bay State.—Judge Morton in the United States District Court on Jan. 2 authorized Receiver Donham of the Bay State Street Railway to issue \$378,987 of receiver's certificates to pay bond interest due on Jan. 1. The receiver asked for \$766,035. The company had \$355,000 on hand Jan. 1 of which \$200,000 must be reserved for working capital.

New Key Route Bond Issue.—The California Railroad Commission has made an order authorizing the San Francisco-Oakland Terminal Railways to issue its 6 per cent demand notes for \$218,459 and to issue and pledge for their payment \$337,000 of general lien bonds, under the company's general lien mortgage. The notes and bonds are to be issued to banks in lieu of notes and bonds now held by them.

New Capital Issues Proposed.—The Murphysboro & Southern Illinois Railway, Murphysboro, Ill., has applied to the Illinois Public Utilities Commission for authority to issue \$63,000 of stock and \$250,000 of bonds. The company now has 8 miles of electric railway in operation between Murphysboro and Carbondale and the new capital is desired to extend the line from Carbondale to Carterville or Herrin, thus reaching the coal fields of Williamson County.

Suit to Foreclose Begun.—The Mercantile Trust Company, San Francisco, Cal., which has been operating the Fresno (Cal.) Interurban Railway, filed complaint on Dec. 28 looking toward the foreclosure of the trust deed covering all the property of the company. The trust deed was given in September, 1914, to secure a bonded indebtedness of \$250,000. According to the complaint filed by the trustee, interest at 6 per cent payable semi-annually has not been paid since March, 1916.

New Vice-Presidents for American Water Works & Electric Company.—At

the regular meeting of the board of directors of the American Water Works & Electric Company, Inc., J. H. Purdy and Harry E. Towle were elected vice-presidents of the company. Stuart H. Patterson's resignation as vice-president was accepted to take effect Feb. 1 next. As noted in the ELECTRIC RAILWAY JOURNAL of Dec. 8, Mr. Patterson has been elected comptroller of the Guaranty Trust Company, New York.

Bondholders Agree to an Extension.—More than 85 per cent of the bondholders of the Barre & Montpelier Traction Company, Montpelier, Vt., have agreed to an extension of their holdings, and it is anticipated that the balance will consent in the near future. For this reason, it is said, there seems to be no likelihood of the appointment of a receiver. An application to the court, noted in the ELECTRIC RAILWAY JOURNAL of Nov. 17, was followed by efforts to effect a readjustment of the finances of the company.

Common Dividend Passed.—The Pacific Gas & Electric Company, San Francisco, Cal., with an authorized capital of \$100,000,000 and nearly \$66,000,000 common stock in the hands of the public or owned by subsidiary companies, has passed its dividend on the common stock. For eleven months to Nov. 30 the balance after all charges and the preferred dividend allowances was only \$1,569,068, against \$2,340,568 for the eleven months of 1916. This was not nearly sufficient to meet the dividend on the common.

Move to Lift Receivership.—The directors and the stockholders of the Southern Cambria Railway, Johnstown, Pa., have voted favorably upon an additional issue of bonds of \$100,000 to make settlement for damage claims of August, 1916, if they are accepted and the issue is approved by the Public Service Commission. It is said to be expected that the claims will be settled in this manner. The receivership of the company, noted in the ELECTRIC RAILWAY JOURNAL of Feb. 24, has been continued until June 1, 1918, to permit such a settlement.

Orleans-Kenner Sale Jan. 15.—William C. Dufour, special master, will sell the property of the Orleans-Kenner Electric Railway, New Orleans, La., on Jan. 15 at New Orleans, under foreclosure of the mortgage dated April 13, 1914. The property will be disposed of subject to all taxes due and unpaid, assessments on liens prior to the lien of the first mortgage, the purchaser to assume all debts, obligations and liabilities of the receiver. The court reserves the right of exacting payment in cash of a sufficient sum to meet and retire all obligations of the receiver and all costs and expenses of the receivership. The property was offered for sale in September, but no bids were received.

Richmond Line Suspends Operation.—The Richmond & Chesapeake Bay Railway, running from Richmond to Ashland, Va., 14.8 miles, has ceased to operate. The attorney representing the controlling interest in the property obtained from the State Corporation

Commission an authorization for the suspension of business. The road was opened in 1907, and it was intended to continue construction to Washington, D. C. The bonds are said to be held by Gould interests, which own the road. It was suggested that the Virginia Railway & Power Company take over the property in order to furnish transportation to suburban residents who were only partly supplied by other means, but the company did not take any action on the proposition.

New Rochester & Syracuse Mortgage Filed.—The Rochester & Syracuse Railway, formed as successor to the Rochester, Syracuse & Eastern Railroad, has filed for record its first mortgage to the Trust Company of Onondaga at Syracuse, as trustee, to secure an authorized issue of not to exceed \$5,000,000 of first mortgage 5 per cent gold bonds dated May 1, 1917, and due May 1, 1957. Under the terms of the plan for the reorganization of the company, to which reference has been made previously in the *ELECTRIC RAILWAY JOURNAL*, \$2,500,000 of the bonds are issuable forthwith in partial exchange for old first mortgage bonds, \$500,000 are also issuable at once for improvements, and \$2,000,000 are reserved for future improvements, additions, extensions, etc.

Offer for Rails of "Dan Patch" Cut-Off.—President C. T. Jaffray of the First & Security National Bank, Minneapolis, who is chairman of the bondholders' committee which recently purchased the 14-mile cut-off of the "Dan

Patch" line under foreclosure, received a telegram on Jan. 4 from R. B. Marchand and of J. G. White & Company, New York, N. Y., another member of the committee, offering a price of \$75 a ton f.o.b. at an Atlantic port for the rails of this section. The remaining part of the company's 56-mile system was not bid in at the recent sale and is still being operated by the receiver. Mr. Jaffray, Mr. Marchand and A. H. Jackson of the General Electric Company formed the bondholders' committee which bought the cut-off. Mr. Jaffray wants, if possible, to keep the line in operation for the benefit of the city of Minneapolis.

Seven Pines Line Sold to Ambassador Willard.—Under a decree of the law and equity court on Dec. 17, Joseph E. Willard, ambassador to Spain, acquired from the Richmond & Rappahannock River Railway its line between Twentieth and P Streets, Richmond, and Seven Pines. Mr. Willard is the principal stockholder and the only bondholder of the Richmond & Rappahannock River Railway, the receivership of which was noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 17. The Seven Pines line, it is said, will be operated as a separate and distinct corporation, the Richmond & Seven Pines Railway having been chartered for this purpose. The remaining 16.3 mile section is headed toward dismantlement. According to the latest information the State Corporation Commission has granted the petition of the Richmond & Rappahannock Railway for dissolution, but

the sale of the equipment is to be held up until Director of Railroads William G. McAdoo decides upon the utility of the line for public or war purposes. Service has been discontinued on the unsold part of the property.

Reasons for Plymouth & Shelby Receivership.—A change in mileage has taken place in connection with the Sandusky, Norwalk & Mansfield Railway and the Plymouth & Shelby Traction Company, which explains the recent receivership of the latter line. The change is the result of a lawsuit which was begun against the receiver of the Sandusky, Norwalk & Mansfield Electric Railway in 1913, when the Plymouth & Shelby Traction Company was put for rental from the receiver. The receiver, however, contended that at least 1 mile of the track belonged to the Sandusky, Norwalk & Mansfield Railway, and he questioned the ownership of the other 6.97 miles of track supposed to be part of the Plymouth & Shelby Traction Company. In October, 1917, the United States District Court finally disposed of the case and conveyed the 1 mile of track to the Sandusky company. Moreover, the court held that the Plymouth & Shelby Traction Company was a fraudulent corporation and placed the property in the hands of the receiver of the Sandusky line. The bondholders of the Plymouth & Shelby Traction Company will have to show they were innocent purchasers of bonds, and all who are not found to be such will have their bonds wiped out by the court.

Electric Railway Monthly Earnings

AURORA, ELGIN & CHICAGO RAILROAD, WHEATON, ILL.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '17	\$181,128	\$135,239	\$45,889	\$35,619	\$10,270
1 " " '16	173,987	115,884	58,103	35,819	22,284
12 " " '17	1,819,988	1,301,182	518,806	357,279	161,527
12 " " '16	1,711,658	1,137,113	574,545	362,313	212,232

BANGOR RAILWAY & ELECTRIC COMPANY, BANGOR, ME.

1m., Nov., '17	\$76,081	\$38,838	\$37,243	\$19,657	\$17,586
1 " " '16	73,298	41,330	31,968	18,408	13,560
12 " " '17	876,070	498,516	377,554	227,430	150,124
12 " " '16	823,553	453,550	370,003	213,869	156,134

CHATTANOOGA RAILWAY & LIGHT COMPANY, CHATTANOOGA, TENN.

1m., Nov., '17	\$111,216	\$112,519	\$13,303	\$30,866	\$132,169
1 " " '16	103,536	73,866	29,670	29,735	765
12 " " '17	1,335,115	1,096,202	238,913	358,507	119,594
12 " " '16	1,230,205	798,411	431,794	355,949	75,845

COMMONWEALTH POWER, RAILWAY & LIGHT COMPANY, GRAND RAPIDS, MICH.

1m., Nov., '17	\$1,822,283	\$1,186,101	\$636,182	\$466,230	\$169,952
1 " " '16	1,510,666	860,290	650,376	426,081	224,295
12 " " '17	19,460,726	11,919,695	7,541,031	5,255,160	2,285,871
12 " " '16	16,705,218	9,064,088	7,641,130	5,020,444	2,620,686

CONNECTICUT COMPANY, NEW HAVEN, CONN.

1m., Nov., '17	\$788,828	\$698,131	\$90,697	\$109,825	\$133,327
1 " " '16	759,716	636,392	123,324	96,488	149,557
11 " " '17	9,185,515	7,293,993	1,891,522	1,098,820	\$991,276
11 " " '16	8,758,236	6,294,702	2,463,534	1,079,337	\$1,633,225

CUMBERLAND COUNTY POWER & LIGHT COMPANY, PORTLAND, ME.

1m., Nov., '17	\$243,036	\$170,298	\$72,638	\$69,843	\$2,795
1 " " '16	229,986	154,531	75,455	69,058	6,397
12 " " '17	3,078,224	2,036,623	1,041,601	816,409	225,192
12 " " '16	2,845,347	1,751,043	1,094,304	808,838	285,466

LEWISTON, AUGUSTA & WATERVILLE STREET RAILWAY, LEWISTON, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '17	\$71,307	\$57,327	\$13,980	\$15,457	\$1,477
1 " " '16	61,871	47,460	14,411	15,246	785
12 " " '17	899,313	672,771	226,542	186,425	40,117
12 " " '16	798,318	543,474	254,844	188,312	66,532

NASHVILLE RAILWAY & LIGHT COMPANY, NASHVILLE, TENN.

1m., Nov., '17	\$212,264	\$134,094	\$78,170	\$40,628	\$37,542
1 " " '16	199,981	120,520	79,461	42,314	37,147
12 " " '17	2,452,118	1,577,178	874,940	492,061	382,879
12 " " '16	2,370,491	1,445,906	924,585	509,791	414,794

NEW YORK & STAMFORD RAILWAY, PORT CHESTER, N. Y.

1m., Nov., '17	\$24,889	\$24,220	\$669	\$7,982	\$17,239
1 " " '16	22,650	22,367	283	7,987	17,659
11 " " '17	369,882	314,853	55,029	87,818	132,168
11 " " '16	332,520	270,906	61,614	87,836	125,716

NEW YORK, WESTCHESTER & BOSTON RAILWAY, NEW YORK, N. Y.

1m., Nov., '17	\$44,345	\$46,699	\$2,354	\$5,725	\$17,362
1 " " '16	52,414	47,276	5,138	\$5,972	12,666
11 " " '17	509,569	508,601	968	\$79,507	\$168,580
11 " " '16	515,498	535,956	\$20,458	\$85,391	\$160,203

PORTLAND RAILWAY, LIGHT & POWER COMPANY, PORTLAND, ORE.

1m., Nov., '17	\$525,811	\$324,600	\$201,211	\$177,512	\$23,699
1 " " '16	479,367	242,563	236,804	182,115	54,689
12 " " '17	5,942,084	3,354,412	2,587,672	2,156,099	431,573
12 " " '16	5,453,455	3,035,833	2,417,622	2,177,998	239,624

WESTCHESTER STREET RAILROAD, WHITE PLAINS, N. Y.

1m., Nov., '17	\$18,669	\$24,472	\$5,803	\$2,633	\$18,840
1 " " '16	14,063	17,211	3,148	2,018	11,138
11 " " '17	228,459	256,773	\$28,314	24,630	\$152,631
11 " " '16	210,971	226,143	\$15,172	20,014	\$31,898

*Includes taxes. †Deficit. ‡Includes non-operating income.
§Excludes interest on bonds of the company, paid by the New York, New Haven & Hartford Railroad under guarantee, also

interest on notes held by the New York, New Haven & Hartford Railroad not credited to income of that company.

Traffic and Transportation

Through Service Case Decided

Public Service Commission Refuses to Order Restoration of Through Service by Foreign Cars

Restoration of through service by foreign cars between Lexington and Harvard Square, Cambridge, Mass., was recently petitioned the Massachusetts Public Service Commission by citizens of Lexington. The service complained of is furnished by the Middlesex & Boston Street Railway, operating between Lexington and Arlington Heights and by the Boston Elevated Railway between the latter point and Harvard Square, where transfer to Boston is made via the Cambridge subway.

Formerly the cars operated by the Middlesex & Boston Street Railway were operated over the Boston company's tracks to Harvard Square on a thirty-minute headway. In June, 1916, through service was discontinued. The Middlesex & Boston Street Railway cars are now operated to Arlington Heights only so that Lexington passengers going to or from Boston are compelled to change cars at the former point.

The Boston Elevated Railway operates surface cars on a six-minute headway between Arlington Heights and Harvard Square, and the Middlesex & Boston Street Railway on a thirty-minute headway during normal hours, with rush-hour service on fifteen-minute time. The petitioners complained that the transfer causes them much inconvenience and delay, especially when outward bound from Boston to Lexington.

LARGE CARS AND TRAILERS NECESSARY

At the hearing the Boston Elevated Railway presented evidence that the line from Arlington Heights to Harvard Square, especially between the latter point and Arlington Center, has a very heavy traffic and contended that the present facilities for handling surface car traffic at Harvard Square were inadequate and that, in order to utilize present car and track facilities most efficiently, large car and trailer operation was necessary. Under the old arrangement the lack of carrying capacity and the smaller entrances and exits of the cars of the Middlesex & Boston Street Railway caused delay in loading which retarded traffic generally on the line.

COMMISSION CONCEDES OBJECTIONS

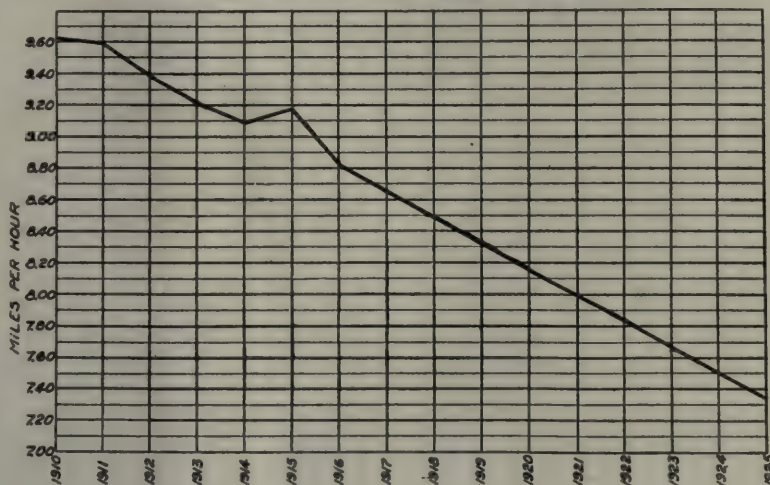
The commission has issued a decision, in which it concedes these objections to be valid. It points out that if either company had sufficient or suitable cars to operate on the joint route, these objections would be of less weight; but as neither company has such cars that it can divert to this use, it follows that the part of the complaint

relating to through service must be dismissed. Incidental to the discussion of through service there was much complaint regarding the inconvenience of transfer facilities at Arlington Heights, the terminus of each system. The commission recommends that as soon as financial conditions warrant, a waiting station be constructed with platform arranged between tracks of the two companies, to facilitate transfer under shelter.

Diagram of Detroit Speed

The Detroit (Mich.) United Railway published in *Electric Railway Service* recently the accompanying diagram, showing the average rate of speed of Detroit city passenger cars as it has been in the past, commencing with the year 1910 down to the present time and estimated from 1917 to 1925 based on past experience. In Detroit skip-stop operation has not increased the speed of the cars as has been stated

AVERAGE SPEED IN MILES PER HOUR OF DETROIT CITY PASSENGER CARS.
ESTIMATED FOR YEARS 1917 TO 1925 INCLUSIVE BASED ON AVERAGE FROM 1910 TO 1916



HOW SPEED OF DETROIT CARS IS DIMINISHING

so often; the saving has been wholly in reducing the number of unnecessary stops.

From a speed of something more than 9½ m.p.h. in Detroit in 1910 the reduction has been gradual, except when conditions in 1914 permitted a slight improvement. Since then the decline has been steady until at the present time the average is less than 8½ m.p.h. The abolition of skip-stop operation will make the decline even more marked in the years to come if Detroit continues to grow. The company asks whether the outlook is pleasing to those who travel over its lines for any considerable distance.

Massachusetts Governor Reasonable

Governor McCall of Massachusetts Urges Equitable Rates of Fare for Electric Railways

A rate of fare which will pay the fair cost of rendering good service was advocated by Governor McCall of Massachusetts in his inaugural address. In referring to transportation problems, he said:

"I urge upon you (the Legislature of 1918) the importance of improving the efficiency of the transportation systems of the commonwealth. The national government is now operating the steam railroads of the country, and for the present they are practically taken from the field of our consideration. Our electric railway systems are in a deplorable condition, both with regard to their financial strength, and, as to the most of them, with regard to the character of the service they render the public.

"The State should require that these corporations be honestly and economically managed, and that they provide good accommodations for their patrons and do away with the excessive crowding of cars. The companies should, however, be permitted to receive for this

service a rate of fare which would pay the fair cost of rendering such service. Our people do not desire transportation wholly or in part free, but they desire and should receive good service and at its fair cost. The chief elements of cost of such service are reasonable wages, maintenance of the property, and a fair return upon actual investment, and not upon inflated values.

"I recommend legislation designed to enable our electric railways to be efficient servants of the public. If the Public Service Commission does not possess sufficient authority in the premises I recommend that additional authority be granted to that body."

Company Paper

San Diego Electric Railway States What It Hopes to Accomplish with Its New Paper

Brief mention was made in the *ELECTRIC RAILWAY JOURNAL* of Jan. 5, page 62, of the establishment of the *San Diego Electric Railway News*. The company has stated its aim in the first issue of the paper as follows:

"The purpose of this little paper is to create friendship between the public and the street car system. Its policy is to tell people the truth about railway operation in order that they may acquire a better knowledge of the subject and consequently be better able to exercise their judgment in railway matters when the same shall be necessary. It is hoped through this publication to promote a closer relationship between the traveling public and the electric railway system.

COLUMNS OPEN TO THE PUBLIC

"The *San Diego Electric Railway News* will print from time to time matters of interest in connection with the transportation of passengers not only in San Diego, but in other communities in the United States and in foreign countries as well.

"The columns of the paper will be

kept open to the public as far as possible. The editor will be glad to receive signed letters containing suggestions regarding service, etc. After such letters have been referred to the proper department head for consideration, if they are of sufficient public interest, they will be published with the company's statement in reply.

EMPLOYEES HUMAN—LIKE PRAISE

"The San Diego Electric Railway aims to give satisfactory service to its patrons and to have its employees both courteous and attentive to the needs of the public. Its officials are glad to be informed of any defect in the service or any discourtesy or inattention on the part of its employees. Any complaints along these lines should be sent to the editor of the *San Diego Electric Railway News* where they will be promptly taken care of. At the same time, it is hoped that the public will just as readily write to the editor when they think a conductor or motorman or any other employee is deserving of praise for attention to his duties and his attitude toward the patrons of the company.

"This little paper will be published once a month and distributed in the company's cars as long as the edition lasts."



HEADING OF NEW PUBLICATION OF THE SAN DIEGO ELECTRIC RAILWAY COMPANY

Six-Cent Fare for Portland

Commission Considers Existing Rates Confiscatory — Public Ownership Would Not Help

The Portland Railway, Light & Power Company was granted a 6-cent fare in a decision handed down by the Public Service Commission of Oregon on Jan. 5. The new rates are effective from Jan. 15. They are as follows: Cash fares, 6 cents. Unlimited tickets five for 30 cents to be sold by all conductors. Unlimited book tickets of fifty to be sold for \$2.75. Limited tickets for school children 4 cents each. All tickets and cash fares are to include transfer privileges. In its ruling the commission says:

"It is evident to the commission that if the company be denied relief it must inevitably go into the hands of a receiver, for on the interurban lines the operating expenses equal the receipts, and the earnings of the light and power department are insufficient to meet the bond interest of the whole system or even to make a fair return on the investment in that branch of the utility."

The commission holds that relief is absolutely necessary because since 1912 the company has encountered financial stringencies, suffered from an enormous increase in the number of private automobiles, had to meet jitney competition and been confronted with war prices, a combination of adverse conditions with which no industry unable to protect itself by an increase of prices could possibly contend.

PUBLIC OWNERSHIP WOULD NOT HELP

The commission holds that public ownership would not solve the problem because the cost of service would not be less than now and because if the city undertook to take over the property it would be required to pay probably 25 per cent more than the commission valuation, and the money for such purpose could not be secured for less than 6 per cent, so that the present interest charge would not be reduced.

The decision also holds that in spite of the fact that the company for the last two months has attempted to inaugurate all the economies suggested in the commission's former decision refusing an increase in fare relief sufficient

Freight Plan Discussed

Matter of Handling Freight on Chicago Surface and Elevated Lines Before Council Committee

The proposed plan to allow the surface and the elevated railways operating in Chicago, Ill., to carry freight was discussed on Jan. 4 before the subcommittee of the City Council on local transportation. The Aldermen favored the proposition, except that such a plan might interfere with the carrying of passengers.

John E. Wilkie, assistant to the president of the Chicago Surface Lines, is reported to have said:

"We would have to construct elevators and loading stations and certainly would have to look on the proposition as a permanent one and not a war measure, because it would entail the expenditure of a lot of capital."

G. T. Seely, assistant general manager of the Chicago Elevated Railways, agreed with Mr. Wilkie. He said:

"Before this could be carried out a plan should be made for developing it on a big scale. It would not help matters simply to adopt it as a war measure. The investment must be considered."

Most of the members of the subcommittee declared that they would sanction the plan if it provided for carrying freight after the usual hours. The representatives of the roads will go into the matter and report back to the subcommittee before any further action is asked.

Pittsburgh Fare Answer

The Pittsburgh (Pa.) Railways on Jan. 3 filed with the Public Service Commission an answer to the complaint of the city of Pittsburgh against the proposed increase in fares from 5 to 5½ and 6 cents. The company declares the proposed increase is absolutely necessary if it is to operate under its present organization.

It is hinted in answer that unless the increase is allowed the company will break up into separate units represented by various underlying companies, thus depriving the public of benefits incident to operating the lines as a unit. Intense labor competition due to the war, the high cost of materials, and the refusal of trainmen to operate trailers and trippers are among the reasons set forth urging more fare.

It is maintained that the service is reasonably adequate under existing conditions. The Public Service Commission will fix a date for a hearing on the city's complaint. The increase is to become operative on Jan. 22.

to prevent insolvency would not be forthcoming. The commission also points out that the law forbids the establishment of rates whose effect would be confiscatory of the property of a utility and that "it has been shown to the satisfaction of the commission that the existing rates with the present cost of operation are in fact confiscatory."

Hearing on Indianapolis-Cincinnati Fares

Indiana Commission Takes Under Advisement Request for a Two and One-Half Cent Rate

The preliminary hearing on the petition of the Indianapolis & Cincinnati Traction Company for a 2½-cent rate of fare was heard before the Public Service Commission of Indiana on Jan. 3. The principal argument hinged on the question as to whether the 2-cent railroad passenger fare law of the State applied to the interurban railroads.

PRESIDENT HENRY REPRESENTS THE COMPANY

Charles L. Henry presented the case of the company. His argument was based on three principal points. He contended that if the 2-cent fare law, as applied to the interurban roads, was shown to be confiscatory, there should be relief under the Constitution for the interurbans, regardless of the 2-cent fare law; that many decisions of courts and opinions of attorney-generals and rulings of the public service commission and the former railroad commission showed that the trend of opinion generally on these authorities was to the conclusion that the 2-cent fare law did not apply to interurbans, and that the Public Service Commission act, and its later interpretation, implied, at least, that the law was not applicable to the interurban roads, and, therefore, that the interurbans might legally secure through the commission increased fares for passenger service.

CITY ATTORNEY PROTESTS

R. W. Harrison, city attorney of Shelbyville, one of the principal towns on the lines of the company, argued that the Indiana courts had uniformly held that statutes may not be repealed by implication. He pointed to the fact that the Legislature of 1917, which amended the 2-cent fare law, did not see fit to amend it so as to make the interurbans specifically exempt from its provisions. He stated that the Legislatures had felt that the interurbans, by competition, would be kept within the 2-cent limit, and that the law intended throughout that the interurban roads should not exceed the 2-cent-a-mile limit.

OPPOSITION LACKS SUPPORT

Mr. Henry has received a communication from the Chamber of Commerce of Shelbyville that they were not in sympathy with the attitude of the city in opposing the petition of the company, and that they believed the interurban railways were entitled to receive increases in the rates of fare for both passenger and freight service.

CASE UNDER ADVISEMENT

The Public Service Commission announced at the conclusion of the argument that it would take the case under advisement, and if it decided that it had jurisdiction in the matter would appoint a time within a few days to hear the evidence. On Jan. 7 the commission

forwarded a communication to the company, stating that it had been unable to reach a decision in regard to its jurisdiction, but appointed Jan. 9 as the time when a hearing would be held and the attitude of the commission in the case made known.

Transportation News Notes

Straight Fare for Danville.—The Danville Street Railway & Light Company, Danville, Ill., a subsidiary of the Illinois Traction System, is said to be preparing to petition the Public Utilities Commission of Illinois for permission to abolish the sale of eleven tickets for 50 cents and to charge instead a straight 5-cent fare.

"Trolley Weal" to Issue Quarterly.—In keeping with the national movement for conservation of material and labor, the *Trolley Weal*, which is published in the interests of the employees of the Public Service Corporation of New Jersey, will, until further notice, be issued quarterly instead of monthly. The next issue of the *Trolley Weal* will appear in March.

Near-Side Stops Desired.—Councilman Meyers has prepared a resolution to be introduced in the Council of Cleveland, Ohio, which will require all cars to stop on the near side at crossings. At the present time they stop on the near side at all safety zones and at crosstown lines. His desire is to make this custom uniform throughout the city.

Electric Railway Rate Application Not Affected.—The Railroad Commission of California has decided that Government railroad control will not affect the applications for rate increases which electric railways have filed. The news has strengthened electric railway securities, and, with the freight business these lines are developing, the prospects in this field are much better than they have been.

New Beaver Valley Rates.—The Beaver Valley Traction Company, New Brighton, Pa., has issued on the thirty days' statutory notice a new schedule of rates and fares for service in the Boroughs of Beaver, West Bridge-water, Rochester, Monaca, Freedom, Conway, New Brighton, Beaver Falls, College Hill and surrounding territory. The fares between all points shown in the former tariff as 5 cents will hereafter be 6 cents. A fare zone has been added for through passengers from Twelfth Street, Conway, to Vanport. Cut-rate tickets in books of twenty-one for \$1 will be discontinued. The

new 6-cent tickets will be offered in strips of ten for 55 cents. The new rates are effective from Jan. 26.

New York Roads Cancel Interchangeable Fares.—The Auburn & Syracuse Electric Railway; the Buffalo, Lockport & Rochester Railway; the New York State Railways and the Rochester & Syracuse Railroad have all filed with the Public Service Commission for the Second District of New York rate changes which indicate that the rules and regulations governing the sale of interchangeable coupon ticket books at a price of \$10 for an aggregate of \$12 worth of transportation will be canceled and their sale discontinued, effective from Feb. 1.

More Snow Equipment Recommended.—Because of the practical tie-up of a number of surface railways in the Bronx, some of which were not opened for full service until four days after the recent storm, the Public Service Commission of the First District has sent a letter to Edward A. Maher, Jr., vice-president of the Union Railway, recommending that that company purchase six snow plows in order to clear its tracks in time of future storms. The letter points out that the type of snowsweepers used by the company are not sufficient or efficient during a heavy fall of snow.

Fare Hearing in New York Goes Over.—The hearing before the Public Service Commission for the First District of New York on the applications of the Third Avenue Railway, the New York Railways, the Brooklyn Heights Railroad, the Staten Island Midland Railway and the Richmond Light & Railroad Company relative to changes and advances in rates of fare has been postponed until Jan. 21. F. J. H. Kracke and Charles Bulkley Hubbell, new commissioners appointed recently by Governor Whitman, have taken up their duties with the commission as the successors to William Hayward and H. W. Hodge, both in military service. Meanwhile they will acquaint themselves with the proceedings so far taken with respect to the fare applications.

I. T. S. Flat Fare Allowed.—The Public Utilities Commission of Illinois on Jan. 5 issued an order allowing the Illinois Traction System to change the basis of fares from the 5-cent zone system to a 2-cent-a-mile basis on the showing of the company in the petition that the change would remove discrimination and would increase the revenue less than one-third of 1 per cent. The ruling also allows a 2½-cent cash fare where paid on the train by a passenger boarding at an agency station. This is designed to relieve conductors now overburdened by the collection of cash fares and the war tax and to encourage the purchase of tickets at stations. The company will file the proposed tariffs to become effective on Feb. 1. The reasons for the proposed change were summarized in the item "I. T. S. Applies for Mileage Basis Fares," which appeared in the *ELECTRIC RAILWAY JOURNAL* for Oct. 27, page 791.

Personal Mention

Thomas F. Mullaney has just resigned as chief engineer of the Third Avenue Railway, New York, N. Y.

W. C. Culkins, who has been street railway commissioner of Cincinnati, Ohio, has been appointed to the office of Director of Street Railroads under the provisions of the new city charter and the new franchise ordinance of the Cincinnati Traction Company.

Henry N. Staats, who resigned on Dec. 1 as insurance expert of the American Electric Railway Association, has accepted the position of insurance expert of the Associated Building Owners of America. Mr. Staats has an office in the Monadnock Building, San Francisco, Cal.

Carrie A. Swartz has been appointed assistant claim adjuster of the Columbus Railway, Power & Light Company, Columbus, Ohio. Miss Swartz is also acting secretary of the American Electric Railway Claims Association, the secretary and treasurer of which, B. B. Davis, died recently.

H. C. Kaerscher, formerly master mechanic of the Elmira Water, Light & Railroad Company, Elmira, N. Y., has been appointed to succeed Niles Persons as assistant master mechanic of the New York State Railways, Rochester lines. The appointment of Mr. Persons to Gary, Ind., is noted elsewhere in this department.

Edward Coy was recently appointed engineer of maintenance of way of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill., as noted in the *ELECTRIC RAILWAY JOURNAL* of Dec. 22. In the item which appeared at that time reviewing Mr. Coy's career the name was printed "Troy" through a typographical error.

Walter C. Douse has been appointed purchasing agent of the Toronto & York Radial Railway, Toronto, Ont., to succeed G. K. Hyde. Mr. Douse spent nearly five years with the Toronto Hydro-Electric system as chief clerk and was also connected for almost five years with the Toronto (Ont.) Railway as assistant purchasing agent.

Thomas P. Burke, who since August last has been supervisor of the railway lines of the Public Service Corporation of New Jersey between Trenton and Newark, has resigned from the company. Before that Mr. Burke was supervisor of the Middlesex division for eleven years. He has been connected with the Public Service Corporation and its predecessors for more than twenty-three years.

Carl H. Van Hooven, claim agent of the Manila Electric Railroad & Light Company, Manila, P. I., is on a visit to the United States. He is calling on a number of the representative electric railways throughout the country to study their methods of handling

claims. Mr. Van Hooven went to Manila from St. Paul more than ten years ago and began work on the street railway there as a motorman. Since then he has taken a degree at the university and been admitted to the Bar.

Niles Persons has resigned as assistant master mechanic of the New York State Railways, Rochester Lines, to accept a position as master mechanic of the Gary & Interurban Railway. Previous to becoming connected with the company at Rochester Mr. Persons was assistant master mechanic of the United Traction Company, Albany, N. Y. He has been in railway shop and maintenance work for the last twelve years, starting as apprentice in the armature department of the United Traction Company.

John A. Hillman has resigned as master mechanic of the Dayton (Ohio) Street Railway. Mr. Hillman started his electric railway career as a helper, wiring electric cars for the Cincinnati (Ohio) Traction Company. From there he went to the Cincinnati, Newport & Covington Traction Company and then to the Cincinnati, Georgetown & Portsmouth Railroad, Cincinnati. He then became connected with the Bullock Electric Company, Cincinnati, and later entered the employ of the Cincinnati Traction Company. Mr. Hillman's next position was with the Cincinnati Car Company, where he was in charge of truck repairs. He left the Cincinnati Car Company to become connected with the Dayton Street Railway.

John Hayes Smith, consulting engineer, Milwaukee, Wis., has closed his office to accept a position as assistant engineer to the Public Service Commission of Pennsylvania. Mr. Smith was graduated from Cornell University. He associated himself with the Westinghouse Electric & Manufacturing Company shortly after graduation and remained in the employ of that company about six years. He was the first manager of the *Electric Journal*, Pittsburgh. He resigned from that paper to become editor of the *Electrical Age*, New York, in which capacity he continued for four years. Since that time Mr. Smith has been in Milwaukee. For two years he was with the Milwaukee Electric Railway & Light Company, resigning as commercial engineer to take up consulting work.

N. R. Longfellow has severed his connections with the Lewiston, Augusta & Waterville Street Railway, Lewiston, Me., to accept the position of general manager of the Waterville, Fairfield & Oakland Railway, Waterville, Me. Mr. Longfellow is thirty-two years of age. At the age of seventeen he entered the service of an electric launch manufacturing company in New Jersey. Two years later he entered the service of the Augusta, Winthrop & Gardiner Rail-

way, Lewiston, Me., as general repair man. In 1910 he was made foreman of the repair shops at Augusta, then under the management of the Lewiston, Augusta & Waterville System. In 1914 he was made general foreman of repairs for the entire system with headquarters at Lewiston and has continued in that capacity since then. Mr. Longfellow is a man of pleasing personality and is exceptionally popular with all the employees and the heads of the departments.

Robert A. Hadden, Joplin, Mo., has been appointed assistant manager of the Bangor Railway & Electric Company, Bangor, Me., succeeding Maurice E. McCormick, who resigned to accept the position of assistant to Harry Hooper, manager of the New Brunswick Power Company, St. John, N. B. Mr. Hadden was educated in Missouri and engaged in electric railway work there. His first work in the East was in New Jersey, where, as a representative of the Cooley & Anderson Company, Ann Arbor, Mich., he was engaged under the direction of the Public Service Corporation of New Jersey on valuation work. His association with that company lasted for several years. In 1916 Mr. Hadden was engaged by the Bangor Railway & Electric Company as an appraisal and valuation expert. His work was of such high order and his services of such value that when the vacancy occurred in the office of assistant manager Mr. Hadden was offered the position. After leaving Bangor in 1916 he went to the Acme Power Company in Toledo, Ohio, controlled by H. L. Doherty & Company. There he had general oversight of electrical construction work in one of the largest electrical plants in the country.

M. J. Perrin, manager of transportation of the San Diego (Cal.) Electric Railway, recently completed his thirtieth consecutive year of service with the company. One night in December last he and about twenty other heads of various Spreckels companies and departments who have been associated with Mr. Perrin during his long connection with the railway celebrated the event in a dinner at the Hotel del Coronado. Among those present were: William Clayton, vice-president and managing director of the Spreckels Companies; Reed Dilworth, James MacMullen, Major C. G. Ross, B. M. Warner, A. Ervast, Claus Spreckels, John J. Hernan, E. M. Harris, George Holmes, J. Fred Traggardh, Frank Von Tesmar, E. L. Phillips, E. J. Burns, W. A. Moore, Nat R. Titus, George A. Cheney, D. W. Pontius, H. G. Wellman, W. R. Saxon, Neil Brown and M. J. Perrin. While the majority of the guests had been connected with the company or associated with Mr. Perrin for a shorter period than thirty years, there were many personal reminiscences of times dating back to the horse-car days. The evening was closed with the presentation by Mr. Clayton on the part of those present of an appropriate token of regard for the host.

Changes in Twin City Officers

New General Manager and New Division Superintendents Appointed by the Twin City Rapid Transit Company

A number of changes has been announced in the personnel of the Twin City Rapid Transit Company, Minneapolis, Minn., further strengthening the organization of that company. Foster Hannaford, for two years superintendent of the St. Paul lines, has been appointed general manager of the company, the duties of which office have been carried on for six years by President Horace Lowry. C. B. Goodsell has been appointed superintendent of the Minneapolis lines to succeed Donald Goodrich, who has enlisted in the naval reserve. Austin L. Cunningham has been appointed superintendent of the St. Paul lines to succeed Mr. Hannaford. O. J. Gilcreest has been appointed assistant to J. J. Caufield, general superintendent.

MR. HANNAFORD

Foster Hannaford, for two years superintendent of the St. Paul lines of the Twin City Rapid Transit Company, has been made general manager of the company. Horace Lowry, president of the company, has carried on the work of this office for six years. After he was graduated from the Sheffield Scientific School Mr. Hannaford was for two years in the Westinghouse shops at East Pittsburgh, did technical work for one year abroad and then entered the employ of the Illinois Traction Company. He became superintendent of substations of that company, and then chief engineer of the McKinley power plant at St. Louis, the largest power plant of the Illinois Traction System. Later he became operating engineer

tended the public schools in Minneapolis and was graduated from the South High School in that city in 1904. He then took a course in the Minneapolis Business College. For about a year after leaving school he was employed in a grain office at Duluth. He next was secretary to the manager of the



A. L. CUNNINGHAM

Minneapolis *Journal* for a year. He joined the Twin City lines on April 1, 1907, as secretary to the general manager, and in 1913 was appointed assistant to the general superintendent, in which position he has continued to the present.

MR. CUNNINGHAM

Mr. Cunningham was born on March 26, 1884, in St. Paul. He was educated

City Lines. Mr. Cunningham has worked for the company as dispatcher, inspector, chief clerk and supervisor.

MR. GILCREEST

Mr. Gilcreest was born in Gainesville, Tex., on Aug. 18, 1886. He was graduated from high school in 1905 and was graduated from the electrical engineering department of the University of Texas at Austin in 1909. During the summer of 1909 he was with a construction crew at Gatesville, Tex. In the fall



O. J. GILCREEST

of 1909 he entered the testing department of the General Electric Company at Schenectady, and in the fall of 1910 took a post-graduate course at the Massachusetts Institute of Technology. In the fall of 1911 he returned to the General Electric Company and then served one year in the switchboard engineering department and two years in the railway commercial department. On Oct. 13, 1914, he entered the service of the Twin City Lines. Mr. Gilcreest has worked for the company as motorman and conductor, inspector, supervisor and later on followed up power saving and more efficient operation of car as to coasting, etc.



FOSTER HANNAFORD

and finally general superintendent of the Galesburg Railway, Light & Power Company, controlled by the Illinois Traction Company. In January, 1916, Mr. Hannaford returned to St. Paul, his birthplace. He is the son of Jule M. Hannaford, president of the Northern Pacific Railway.

MR. GOODSSELL

Mr. Goodsell was born on Sept. 21, 1886, at Fergus Falls, Minn. He at-



C. B. GOODSSELL

in the public schools. He left Cretin High School in 1901, before completing his course, and entered the service of Swift & Company and then worked as a weigher in railway mail service. In 1906 he worked for a general contracting company. In 1908 he was timekeeper and branch office cashier for the Barber Asphalt Company, and from February to September, 1908, was with the Mendota Stone Company. The same year he entered the service of the Twin

Obituary

Alex P. Humphrey, Jr., son of Judge Alex P. Humphrey, the chief counsel and vice-president of the Louisville (Ky.) Railway, was killed when his airplane fell 1500 ft. at Camp Taliaferro, Tex. Cadet Humphrey had been in training since last August.

Peter Leidenger, western sales manager of the Dayton (Ohio) Manufacturing Company, died suddenly of pneumonia at the Buckingham Hotel, St. Louis, Mo., on Dec. 28. Mr. Leidenger was born at Ironton, Ohio, in 1862. He had been with the Dayton Manufacturing Company for the last thirty years.

George Alvah Kittredge, a pioneer in the operation of electric railways in India, died at his home in Brookline, Mass., on Dec. 26, aged eighty-four years. Mr. Kittredge lived in Bombay

for more than half a century, going there as a representative of consular interests soon after his graduation from Yale.

A. C. Miller, president of the Chicago-New York Electric Air Line Railway, Gary, Ind., until May 1, 1916, died suddenly on Jan. 4. He was also vice-president and general manager of the Gary & Interurban Railroad for a number of years.

William Abial Scott, who in 1905 in association with Governor L. B. Hanna and J. W. Smith established the Fargo & Moorehead Street Railway, Fargo, N. D., now controlled by the Northern States Power Company, is dead at his home in Fargo. He was the first vice-president of the company. Mr. Scott was founder of the North Dakota State Fair Association.

Charles S. Foller, sales manager of the Union Spring & Manufacturing Company, Pittsburgh, Pa., is dead. Mr. Foller was evidently drowned in an attempt to cross the Monongahela River on the ice. Mr. Foller went to Pittsburgh when he was twenty-four. For five years he was affiliated with the American Locomotive Company in that city. Then he entered the employ of the Union Spring & Manufacturing Company. Mr. Foller is survived by his widow, one son and three daughters.

Edward B. Smith, head of the banking house of Edward B. Smith & Company, Philadelphia, Pa., is dead. Mr. Smith was born on Sept. 23, 1861. He entered banking in 1886 and in 1892 organized the firm of which he was the head. The firm had a part in many of the large Philadelphia underwritings, among others the Philadelphia Electric Company. Among the electric railways of which Mr. Smith was a director were the Lehigh Valley Transit Company and the Philadelphia & Western Railroad. He was one of the organizers of the Lehigh Power Securities Company.

Lee Howell, president of the Evansville, Suburban & Newburgh Railway, died on Jan. 3 at Evansville, Ind., at the age of seventy-seven. Mr. Howell had spent all his business life in the service of railroad, interurban and steamboat companies. After serving in the cavalry division of the Confederate Army from 1862 to the close of the war, he began work in the steamboat service on the Ohio and Tennessee rivers. In 1872 he became contracting agent for the Louisville & Nashville Railroad and held this position for eight years. In 1880 he was appointed general freight agent and in 1882 division freight agent of the Evansville, Henderson & Nashville division of the Louisville & Nashville Railroad, and on Nov. 1, 1882, became general freight agent of the Evansville & St. Louis and the Evansville, Henderson & Nashville division of that company, with headquarters at Evansville. He was also the head of the Evansville & Bowling Green Packet Company, operating a line of steamboats between Evansville and Bowling Green, Ky., on the Ohio and Green Rivers.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Franchises

North Vancouver, B. C.—The British Columbia Electric Railway, it is reported, will ask the City Council of North Vancouver for permission to lay tracks on the ferry wharf and to operate cars thereon. The North Vancouver District Municipality will vote at the January elections on a by-law authorizing a grant of \$2,500 to aid the company in this construction.

Waterloo, Iowa.—The Waterloo, Cedar Falls & Northern Railway has accepted the franchise passed by the voters of Waterloo on Dec. 5.

Cumberland, Md.—The Cumberland Electric Railway has received a twenty-five year extension of its franchise from the City Council of Cumberland. Under the terms of the new franchise, which will expire in December, 1942, the company will construct an extension to the Kelly-Springfield Tire Company and the new Ridgedale addition. The plans also include the double-tracking of Green and Water Streets.

Cincinnati, Ohio.—The Cincinnati, Lawrenceburg & Aurora Electric Railway has received a franchise from the City Council of Cincinnati to operate its line from the western corporate limits of Cincinnati to Anderson's Ferry. The ordinance authorizes the removal of approximately 3 miles of track from the Lower River Road to a private right-of-way on Commercial Avenue.

Track and Roadway

Edmonton (Alta.) Municipal Railway.—A report from the Edmonton Municipal Railway states that it has under construction 900 ft. of track interconnecting two parallel lines.

Municipal Railway, San Francisco, Cal.—About 2.44 miles of line will be placed in service by the Municipal Railway during this year.

Denver (Col.) Tramway.—A report from the Denver Tramway states that during 1918 it expects to place in service 1½ miles of new track. It also expects to third-rail the Gold division from Gravel Spur, about 4 miles.

Connecticut Company, New Haven, Conn.—It is reported that this company will build an extension to its line from Terryville to Thomaston.

Georgia Railway & Power Company, Atlanta, Ga.—In view of the inadequacy of the single-track line from Buckhead to Camp Gordon, the Georgia Railway

& Power Company plans to double-track the line to a point near the intersection of Piedmont Road and Peachtree Road. If it should later develop that extension of the double track beyond the point at present contemplated would be necessary for improved service, the company plans to continue the extension.

Chicago (Ill.) Surface Lines.—An extension will be built by the Chicago Surface Lines on Monroe Street from La Salle to Canal Street.

Peoria (Ill.) Railway.—This company reports that it will reconstruct 5 miles of track during this year.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—The Board of Public Works has extended until June 1, 1918, the time limit fixed for double-tracking the West Michigan Street line from Holmes Avenue to Tibbs Avenue. March 15 was the date fixed as the time when the company should complete the turn-outs and other improvements in Brookside Avenue, so that the line may also be double-tracked, if found necessary. The board extended until July 1, 1918, the time limit for completion of the North Illinois Street car line extension from Maple Road to Forty-sixth Street, and the same date was set for the completion of the South Street tracks from Virginia Avenue to Delaware Street.

Wichita Railroad & Light Company, Wichita, Kan.—This company reports that during this year it expects to place in service about 1½ miles of new track.

United Railways & Electric Company, Baltimore, Md.—This company reports that it expects to place in service during 1918 a 2-mile extension to Fairfield and a 1-mile extension on Columbia Avenue.

Pascagoula Street Railway & Power Company, Pascagoula, Miss.—This company reports that it will rebuild 3 miles of track this year.

Kansas City (Mo.) Railways.—The City Commissioners of Kansas City, Kan., have let the contract for building the Central Avenue viaduct, subject to the approval of the Kansas City Railways. The cost will be \$192,000, of which one-third will be borne by the Kansas City Railways and the other two-thirds equally by the Missouri Pacific Railway, the Union Pacific Railroad and the Chicago, Rock Island & Pacific Railway. The completion of the Central Avenue viaduct will extend the traffic way from Riverview Avenue, Kansas City, to the high line bridge across the Kaw River.

United Railways, St. Louis, Mo.—A report from the United Railways states that the company expects to place in service 3½ miles of new track during 1918. It also plans to reconstruct about 15 miles of track during this year.

New York Municipal Railway, Brooklyn, N. Y.—The new Broadway subway, connecting Rector Street, West Broadway and Forty-second Street at Broadway, was opened for service on Jan. 5. This is the most important link in the dual subway system to be placed in operation since 1913. The New York Municipal Railway, which will operate the new line, has been operating trains under Broadway between Union Square and Canal Street, thence into Brooklyn, for some time.

Nova Scotia Tramways & Power Company, Ltd., Halifax, N. S.—This company reports that it expects to place in service about 3½ miles of city track during 1918.

Cleveland & Sharon Rapid Transit Company, Cleveland, Ohio.—A report from C. H. Felton, secretary of the Cleveland & Sharon Rapid Transit Company, states that grading on its proposed line from Lockwood to Middlefield via North Bloomfield and Mesopotamia has been mostly done. It is expected that the line will be completed this year. The line will be operated by the Cleveland & Eastern Traction Company, furnishing direct connection with Cleveland. No contracts for materials have been let. [Dec. 16, '16.]

City Railway, Dayton, Ohio.—During 1918 this company will place in service 1¼ miles of new track and will rebuild 1 mile of track.

Dayton & Troy Electric Railway, Dayton, Ohio.—This company reports that it will rebuild 1½ miles of city track.

Springfield (Ohio) Railway.—An extension is being built by the Springfield Railway in the Northern Heights addition.

Oklahoma Union Railway, Tulsa, Okla.—The Board of City Commissioners has granted the Oklahoma Union Railway permission to double track its Fourth Street line from Boulder east to Boston Street, in order to facilitate the handling of the interurban and West Tulsa lines which radiate from that point.

Brantford (Ont.) Municipal Railway.—A report from the Brantford Municipal Railway states that it expects to place in service 2½ miles of new track during 1918.

***Montrose, Ont.**—The Hydro-Electric Power Commission of Ontario is building a line from the Welland River, near Montrose, around Niagara Falls City to the Niagara River near Queenston, about 12 miles, in connection with the Chippawa-Queenston power canal. It is reported that about 8 miles of construction has been completed at the northern end of the line. The line will be double-track, standard-gage, 70-lb. rails and will be ballasted with rock. The work is being done under the direction of F. A. Gaby, chief engineer of the commission.

***Whitby, Ont.**—Work has been begun on the construction of a line in Whitby from the Grand Trunk main line station to the military hospital on the lake front. This road will be the

initial unit of the street railway system authorized by vote of the municipality in adopting the hydro-radial proposal from Toronto to Whitby.

Portland & Oregon City Railway, Ore.—A report from the Portland & Oregon City Railway states that it will place in service 10 miles of new track in 1918.

Portland Railway, Light & Power Company, Portland, Ore.—About 1 mile of track will be rebuilt by this company.

Shamokin & Mount Carmel Transit Company, Mount Carmel, Pa.—This company reports that it will construct about ½ mile of new track.

Ponce (Porto Rico) Electric Company.—This company reports that it plans the reconstruction of about ½ mile of track.

Austin (Tex.) Street Railway.—Operation has been begun by the Austin Street Railway on its extension to Travis Heights.

El Paso (Tex.) Electric Railway.—This company reports that it will build 1 mile of new track in 1918.

Mineral Heights Street Railway, Greenville, Tex.—A report from this company states that it is planning to change its method of operation from the overhead system to gasoline motive power.

Norfolk Southern Railroad, Norfolk, Va.—An extension will be built by the Norfolk Southern Railroad in the village of West Munden.

Richmond & Rappahannock River Railway, Richmond, Va.—Joseph E. Willard, Ambassador to Spain, has acquired from the Richmond & Rappahannock River Railway its line between Twenty-ninth and P Streets, Richmond, and Seven Pines, the receivership of which was noted in the ELECTRIC RAILWAY JOURNAL of Nov. 17. The Seven Pines lines, it is said, will be operated as a separate and distinct corporation, while the remaining section is headed toward dismantlement. According to the latest information the State Corporation Commission has granted the petition of the Richmond & Rappahannock Railway for dissolution, but the sale of the equipment is to be held up until William G. McAdoo decides upon the utility of the line for public or war purposes. Service has been discontinued on the unsold part of the property. The Richmond & Seven Pines Railway was recently chartered to operate the property purchased, the president of which is Thomas B. Love, who is also president of the Richmond & Rappahannock River Railway.

Charleston-Dunbar Traction Company, Charleston, W. Va.—A report from the Charleston-Dunbar Traction Company states that during this year it expects to place in service 9 miles of track between the cities of Dunbar and Poca.

Milwaukee Electric Railway & Light Company, Milwaukee, Wis.—This company reports that during 1918 it will reconstruct 5 miles of track.

Shops and Buildings

Southern Pacific Company, San Francisco, Cal.—Plans have been submitted to the Railroad Commission of California by the Southern Pacific Company for the erection of a new \$130,000 depot on the Alameda, San Jose, and the moving of the freight yards to the College Park district. The company will abandon its present railway lines on Fourth Street and will move to its new right-of-way on the western side of the city. The new freight yards will cost \$430,000, while the entire change will cost more than \$1,300,000.

Inter Urban Railway, Des Moines, Iowa.—It is reported that the Inter Urban Railway has had plans prepared for the construction of a four-story brick terminal station to cost about \$200,000.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—Contracts have been awarded by the Trenton & Mercer County Traction Corporation for the construction of a new building to replace that portion of the carhouse at Trenton recently destroyed by fire. Newton A. K. Bugbee & Company, Inc., will do the steel work; Edward LaRue will do the carpentry and Burton & Burton the mason work. The improvements will cost approximately \$11,000. The design of the building will be changed from that of the old structure.

Long Island Railroad, New York, N. Y.—Fire recently destroyed the storage and office building of the Long Island Railroad at Long Island City, together with two freight cars. The loss is estimated at \$125,000.

Toronto (Ont.) Suburban Railway.—A new carhouse and express shed will be built by the Toronto Suburban Railway at Guelph.

Power Houses and Substations

Connecticut Company, New Haven, Conn.—The Public Utilities Commission of Connecticut has approved the application of the Connecticut Company to erect electric transmission lines in New Haven and North Haven.

Hagerstown & Frederick Railway, Frederick, Md.—In addition to the plant at dam No. 4, the Hagerstown & Frederick Railway is building a new power house at dam No. 5. These plants will be connected with the Security plant, which is being enlarged. New transmission lines are being built to Waynesboro and Martinsburg.

Twin City Rapid Transit Company, Minneapolis, Minn.—A new automatic substation is being built by the Twin City Rapid Transit Company at Concord and Isabel Streets, St. Paul. The substation will be ready shortly and will have a capacity of 2000 hp.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Freight Congestion Serious

Time for Pacific Coast Deliveries from East Doubled—Demurrage Rates to Be Increased Jan. 21

So far as can be learned from leading shippers and receivers, deliveries have grown worse rather than better. The situation is said to be more acute in the New York territory than at any other point in the country. The congestion of freight and that of unloaded cars causing this condition has reached the stage where drastic action has been found necessary. Secretary McAdoo, Director-General of Railroads, has named the week of Jan. 14 to 21 for the unloading of cars which have for months been used by consignees here as warehouses.

A jobber carrying one of the largest stocks of railway supplies in the country said deliveries are not only a sore spot, but the situation is almost unbearable. Not only is freight affected by the embargoes, but the express companies, which afforded some relief, even at a higher cost, have in some cases embargoed all but direct and incidental Government business.

Transportation conditions are very much affecting the supply of line material, which is becoming quite scarce in some quarters. Shipments held up by embargoes east of Pittsburgh are a cause of anxiety on the part of distributors. An order for locust pins placed early in June last has not been delivered yet. An acute shortage is in sight. Yellow-pine cross-arms are also in bad shape. Of three cars ordered six months ago one was received here; the others are "somewhere" in the South in transit. Fir arms are hard to get, as the lumber is being requisitioned by the government for aeroplanes and ships.

The time required for Eastern freight deliveries to the Pacific Coast has jumped from seventeen days, which was the average a month or six weeks ago, to thirty to forty days, which is the time in which shipments are now arriving. However, government control of railroads is confidently expected to improve freight shipments.

The California Railroad Commission has decided that Government railroad control will not affect the applications for rate increases which electric railways have filed. This news has strengthened electric railway securities, and, with the freight business these lines are developing, the prospects in this field are much better than they have been.

Relief of congested conditions of the Pacific Northwest terminals is expected

to result speedily from the appointment of a joint committee of railway and steamship officials to devise a solution of the problem. Federalization of railroad lines will lead, it is believed, to an early settlement of terminal problems and is certain to result in an issuance of an order to abandon intraterminal switching. Transcontinental lines are striving to reorganize service, which was disrupted during the past ten days by floods. Work of repairing and rebuilding washed-out bridges in mountain divisions particularly is being rushed under difficulties. Collections fair.

On Monday of this week Director-General of Railroads McAdoo issued a statement showing the imperative necessity that exists for releasing cars for further service and for relieving terminals which are now badly congested and at the same time issuing order No. 3. This order increases demurrage charges to a maximum of \$10 per car per day reached on the eighth day of detention beyond free time. The new demurrage rates will go into effect on Jan. 21.

Government Statistics on Rail Manufacture

Value of Product in 1914 Was More Than \$54,000, a Decrease of 35 Per Cent from 1909

Statistics have just been put out by the Bureau of the Census on iron and steel products manufactured in 1914 showing the production of steel rails and certain rail equipment. Table I shows the rail production in 1899, 1904, 1909 and 1914. The rail production in 1914, it will be noticed, was around 35 per cent less than in 1909.

Rail production in 1914 absorbed 10 per cent of the mill tonnage as com-

pared with 14.8 per cent in 1909, 17.2 per cent in 1904 and 21.6 per cent in 1909, 17.2 in 1904, and 21.6 per cent in 1899. Rail fasteners and rerolled or renewed rails absorbed around an additional 2 per cent.

Data on railroad spikes are available for 1914 only and show fifteen establishments engaged in their manufacture. The output of these mills was 1,366,177 kegs of 200 lb. each, having a total value of \$4,201,388.

Trolley Cord Still Advancing

Uncertainties of Present Market Cause Supply Men to Hesitate to Make Quotations

Railway supply men in New York are very careful when it comes to quoting prices on any material of iron, steel or copper. The eccentricities of the market are apparently beyond their comprehension at times, so they state. On one particular article, namely trolley cord, the gyrations have been unusually hard to follow. Prices have been jumping right along, the latest, effective about two weeks since, going up 7 cents a pound. At that, immediate acceptance of the quotation must be made, or else the offer is subject to cancellation.

A reasonable time is allowed between the date when a quotation is asked and the placing of the order, otherwise a new condition is presented for both the seller and buyer. Not infrequently the factory intervenes with a higher figure than originally named, and no preliminary notice is given of the advance. This has led to no end of complications before an adjustment is reached. Just now the attitude of the seller of supplies and accessories is precarious on the matter of prices, which are likely to change without the slightest intimation from the producer.

Rails	1914	1909	1904	1899
No. establishments.....	15	13	14	
Tons.....	11,842,041	2,858,599	2,194,605	2,251,337
Value.....	\$54,009,918	\$81,128,295	\$58,256,750	\$46,533,159
Open-hearth—				
Tons.....	1,522,684	1,215,072	128,681	
Value.....	\$45,336,381	\$36,400,780	\$3,608,562	
Bessemer—				
Tons.....	319,357	1,643,527	2,065,024	
Value.....	\$8,673,537	\$44,727,515	\$54,627,488	
Rerolled or renewed rails—				
No. establishments.....	8	9	11	
Tons.....	63,671	106,352	99,530	
Value.....	\$1,438,237	\$2,683,017	\$2,480,328	
Rail fastenings (incl. splice bars, tie-plates, fishplates, etc.)—				
No. establishments.....	26	25	(*)	
Tons.....	349,307	396,911	174,055	
Value.....	\$11,526,956	\$14,488,412	\$5,663,052	

Figures not available.

* Includes 27,286 tons of alloy steel rails; titanium steel, 7995 tons; nickel-chrome steel, 4174 tons; manganese steel, 3864 tons; and kinds not specified, 11,853 tons.
* Includes iron rails; 1904, 900 tons; value, \$20,700; 1899, 880 tons; value, \$31,180.
* Includes 1,522,362 tons of basic open-hearth, 144 tons acid open-hearth, and 178 tons of electric steel rails.

Steel Prices in Effect Until March 31

Current Quarter Contracts Calling for Later Deliveries Subject to Government Price Revision

President Wilson has approved the recommendation of the War Industries Board that the maximum prices heretofore fixed by the President upon the recommendation of the board upon ore, coke, pig iron, steel and steel products, subject to revision on Jan. 1, 1918, be continued in effect until March 31, 1918. No new contracts calling for delivery of any of said commodities or articles on or after April 1, 1918, are to specify a price unless coupled with a clause making the price subject to revision by any authorized United States government agency, so that all deliveries after that date shall not exceed the maximum price then in force, although ordered or contracted for in the meantime.

Particular attention is being paid by the steel interests to that part of the approved recommendation pertaining to contracts placed during the current quarter for later delivery. As stated, no prices are to be specified for deliveries later than March 31 except as subject to Government revision. The natural assumption, and this is borne out by the uneasiness of the steel producers, is that any government revision of prices will probably not be upward.

As matters now stand, therefore, contracts may be placed for certain quantities of steel product for delivery later than the current quarter at a certain price or not, but in any event subject to future Government price regulation, which at the present writing does not seem to be inclined toward higher prices.

Probable Market Effects of Federal Road Control

There seems every reason to believe that the assumption of control by the Federal government of the steam railroads will lead shortly to large orders for both rolling stock and road equipment. The purchases will undoubtedly be made under priority orders of the first class. In markets so far behind on orders as those for rolling stock and rails it becomes evident that buyers not falling in the preferred classes will find it more difficult than ever to obtain materials and equipment.

How far the control of electric railways will be taken over by the government is not known at this writing. Already it has been announced that the Lehigh Valley electric system has been taken over. In the event of a wide control of traction properties, it appears that early purchases will probably have to be made of freight rolling stock and rails.

Owing to the existing situation roads have been less careful in rail replacement than formerly. Consequently there is undoubtedly a considerable amount of rail of the country that badly needs replacement.

Just how these purchases are to be

financed is for the present a matter of speculation. It does seem certain, however, that nothing of any consequence will be done in the way of purchases for a month or more. Still, provided the government wishes, as has been repeatedly stated, to maintain the roads in as high a state of efficiency as possible, sooner or later orders of considerable size for new equipment of one kind or another must find their way to the manufacturers.

Market Develops for Sleet Scrapers

Deliveries Being Made Out of Stock With Feeling in Trade That Prices Will Go No Higher

As might be expected devices for removing sleet from wires were in strong demand during and following the recent snow storms in different parts of the country. A number of appliances of this kind are in the market, accomplishing their work along pretty much similar lines. Manufacturers of the sleet cutters, or scrapers as they are called, operating in this field, reported an immense sale.

While there has been no recent change in the price of sleet cutters, with the constant change in copper and brass the manufacturers frankly admit the possibility of a reduction in the near future. It was admitted that, in their judgment, prices were at peak, and that the tendency seemed to be for shorting of prices rather than increasing. Deliveries are said to be prompt, as the goods are kept in stock. The greatest difficulty just now was in securing skilled workmen. Mechanics of the ordinary kind in their line were plentiful enough, but the men desired were scarce and hard to engage at any reasonable wages.

Confusion Regarding Priority Transportation

Fuel Administrator Announces That All Priority Orders Were Suspended on Dec. 31

The Fuel Administration issues the following:

"Despite the fact that formal announcement was made that all priority orders in connection with freight shipments were suspended at midnight Dec. 31, considerable confusion apparently exists in many quarters, as evidenced by many telegrams to the United States Fuel Administration, inquiring as to the status concerning priorities."

The following typical answer to these telegrams is being sent out by the Fuel Administration:

"By direction of Director-General McAdoo, all priority orders heretofore issued with respect to transportation have been suspended and no further priorities may be claimed thereunder. Future orders for priorities will be issued in emergencies under Mr. McAdoo's direction as occasion may require."

Increased Demand for Trolley Wire Noted

Stories Stimulate Orders for Maintenance Equipment—Reduction Noted in the Price for Wire

Buying has about reached the minimum level, but maintenance of track and transmission lines must be kept in workable condition at all hazards, the selling trade takes satisfaction in saying. This means something, and the manufacturers and handlers of trolley wire declare they are fortunate in having reasonably heavy orders placed with them for prompt delivery.

At this time of the year there is always a certain amount of movement in trolley wire, but the recent snow storms have occasioned the buying of an additional quantity. A number of large orders have been recently booked from railways in the eastern territory, a greater portion of which was for quick delivery. The producers, however, commenting upon the orders, stated it was evident only necessity compelled the purchase. The traction companies, it was well understood, were finding it difficult to secure funds to maintain their properties in proper shape, let alone for extensions, and also steam roads for the electrification of parts of their systems in contemplation. At any rate, the orders, such as they were, and representing a considerable amount at that, declared one manufacturer, were welcome, although the major facilities of his plant are given over to governmental work.

Another manufacturer, in speaking of the buying of trolley wire by the railways, stated the quantity was above the average for the winter season, and was doubtless for maintenance purposes only.

The price of trolley wire has been gradually lowered during the past two months, totaling in all a reduction in the neighborhood of 10 per cent. When one of the largest manufacturers of copper wire was asked about the current status of base he promptly said "there is no base." The same authority averred that under the pressure of competition and eagerness for orders base had been quoted at 26 cents for large interests, although 30 cents is the generally recognized figure.

Weatherproof wire is also on the downward scale, according to various sources of information. It was stated that the cost of weatherproof had been greatly enhanced by the high cost of cotton, which had advanced considerably. At one time the covering used for weatherproof wire was a waste or by-product, but now plays a large part in adjusting wire prices. With the reduction, however, in copper ingots and consequently base wire the price of weatherproof has been readjusted. On a large order 28 cents was quoted last week for weatherproof.

In 100 lb. lots weatherproof wire was quoted Monday morning of this week for 34¼ to 35¼ cents in the New York market and 38 to 38.35 cents in Chicago.

Rolling Stock

Galesburg (Ill.) Railway & Light Company suffered the loss of a car by fire Dec. 27, the damage figuring \$2,500.

Toronto & York Radial Railway Company, Toronto, Can., is reported as negotiating for the purchase of four cars.

Long Island Railroad Company, Long Island City, N. Y., lost a storage and office building by fire on the night of Dec. 30. Two freight cars besides were destroyed.

Illinois Traction System, Peoria, Ill., on Dec. 31 had two passenger coaches and a motor car burned in a fire, which partially destroyed its shops and barns at Staunton, Ill. The damage is estimated at \$35,000.

Sandwich, Windsor & Amherstberg Railway, Windsor, Ont., Can., has added to its rolling stock recently three single truck p.a.y.e. cars built in Canada and two double truck steel cars built in the United States.

Pensacola (Fla.) Electric Company recently put in commission two motor cars on its Bayshore line. The cars, which accommodate ninety passengers each driven by two 50 hp. motors respectively, were on delivery since early in August last.

J. G. Brill Company, Philadelphia, Pa., is working on parts for the cars recently damaged by fire in the barn of the Trenton & Mercer County Traction Corporation, as reported in last week's **ELECTRIC RAILWAY JOURNAL**. One of the damaged cars was repaired at the Trenton repair shop. The cars are valued at \$7,500 each.

Georgia Railway & Power Company, Atlanta, Ga., have installed trailer cars on its line to Camp Gordon. Old gondola cars were rebuilt in the company's shops, the motors being removed and new trucks, with 26-in. wheels, substituted. Couplers and air-brakes were installed. Work on several p.a.y.e. cars has also been begun in the company's plant.

Bangor Railway & Electric Company, Bangor, Me., has recently placed an order for three passenger trolley cars of the one-man safety type. They are

said to cost \$6,000 each, f.o.b. St. Louis. Delivery is expected in March. Considering the trouble the Lewiston, Augusta & Waterville system claims to have had in getting delivery of new cars ordered many months ago, there is some speculation as to whether Bangor gets her new cars on time.

New Advertising Literature

Consolidated Expanded Metal Company, Braddock, Pa.: "The Military Camps of Our Allies," twelve-page pamphlet descriptive of the buildings for housing troops in France, Belgium and Great Britain employing expanded metal lathing with cement plaster. There are many illustrations.

Moller & Schumann Company, Brooklyn, N. Y.: Bulletin No. 3 treats of the company's air drying and baking Hilo White enamels. Each article is described as to the kind of work for which it is suited. The method of handling the enamel in order to assure satisfactory results is also given.

Arthur D. Little, Inc., Cambridge, Mass.: "The Little Journal" for December contains plans and perspective view of the new Charles River Road Laboratory of the company at Kendall Square, Cambridge. The leading article is on conservation of our national resources. Instances are pointed out of the waste going on in potash, fuel, labor, etc., when the greater part of these possessions could be saved by the application of scientific principles.

Wilson Welder & Metals Company, New York: Electric welding catalog No. 2. A book, descriptive of the Wilson system of electric welding which was developed on a large trunk line railroad several years ago. An especial claim made for this system is the control over the heat at the point of application, so that the heating can be kept constant and the welding uniform. Any number of welders can work from one large machine. Reduction in energy consumption and labor, as compared with other electric welding outputs, is also claimed. The company also supplies specially prepared welding metal. The catalog is well illustrated and contains a number of tables.

Trade Notes

McGovern & Company, Inc., New York, N. Y., dealers in second-hand machinery, increased their capital from \$150,000 to \$200,000.

Ralph C. Davison, for the past six years with the American Mason Safety Tread Company, has joined the American Abrasive Metals Company, makers of Feralun safety treads and anti-slip surfaces.

H. T. Glover, formerly sales manager of the Esterline Company, Indianapolis, Ind., who enlisted last June with the Canadian Expeditionary Force, is about to start for Europe, if he has not already done so, as a member of the divisional signallers of the Canadian forces. Mr. Glover is a British subject, which accounts for his enlistment in Canada.

W. Jerry Stanton has resigned from the sales department of the General Electric Company, Philadelphia office, to become sales manager of the Railway Improvement Company, New York. Mr. Stanton is a native of Schenectady and since his school days he has been employed in the testing, engineering and sales departments of the General Electric Company.

General Electric Company, Lynn, Mass., will soon begin the construction of three new buildings. The plans call for a two-story brick and concrete office building 142 ft. by 60 ft.; a one-story building 226 ft. by 582 ft. to be constructed of steel, brick, concrete and cement plaster, to be used for general manufacturing purposes, and a two-story building 67 ft. x 340 ft. to be used for a cleaning and core shop.

New York Municipal Railway Corporation, Brooklyn, N. Y., that opens its new subway extension from Fourteenth Street to Times Square (Broadway division, New York) to-day (Jan. 5), will have Johnson fare boxes installed on the stations. The Railway Appliance Company, which is Eastern agent for the Johnson Fare Box Company, has encountered more or less difficulty in getting delivery on the boxes owing to the embargo. Other shipments are in transit.

RAILWAY MATERIAL PRICES

	Jan. 3	Jan. 9
Rubber-covered wire base, New York, cents per lb.	30	30
Wire, weatherproof (100 lb. lots), cents per lb.		
New York	34 1/4-33	34 1/2-35 1/4
Chicago	38-38.35	38-38.35
Rails, heavy, Bessemer, Pittsburgh	\$38.00	\$38.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$40.00	\$40.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.22	\$2.22
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.26	\$1.29
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.27	\$1.30
White lead (100 lb. keg), New York, cents per gal.	10	10
Turpentine (bbl. lots), New York, cents per gal.	48 1/2	48

*Nominal.

OLD METAL PRICES—NEW YORK

	Jan. 3	Jan. 9
Copper, ingot, per lb.	23 1/2	23 1/2
Lead, cents per lb.	6 1/2	6 1/2
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7.82 1/2	7.92 1/2
Tin, Straits, cents per lb.	\$85.50	\$85.50
Aluminum, 98 to 99 per cent, cents per lb.	36	36

NEW YORK METAL MARKET PRICES

	Jan. 3	Jan. 9
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	17 1/2	17 1/2
Yellow brass, cents per lb.	14 1/2	14 1/2
Lead, heavy, cents per lb.	5 1/2	5 1/2
Zinc, cents per lb.	6	6
Steel car axles, Chicago, per net ton	\$42.42	\$42.42
Old carwheels, Chicago, per gross ton	\$35.00	\$35.00
Steel rails (scrap), Chicago, per gross ton	\$33.00	\$33.00
Steel rails (relaying), Chicago, per gross ton	\$55.00	\$55.00
Machine shop turnings, Chicago, per net ton	\$17.50	\$17.50



2851 Sets of Peacock Brakes

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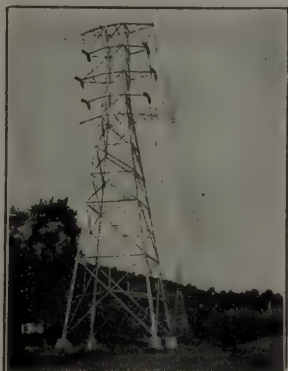
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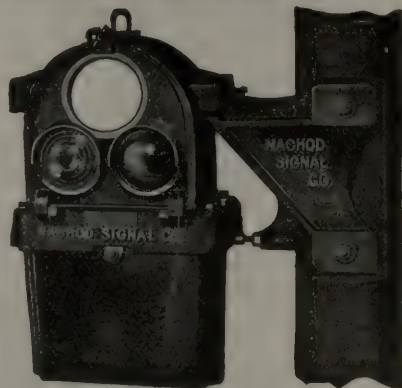
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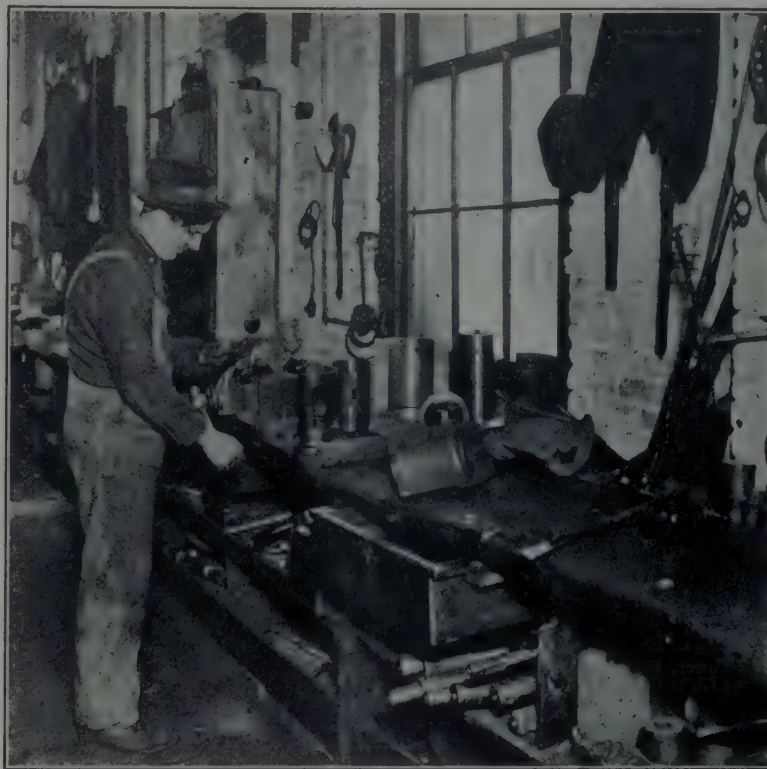
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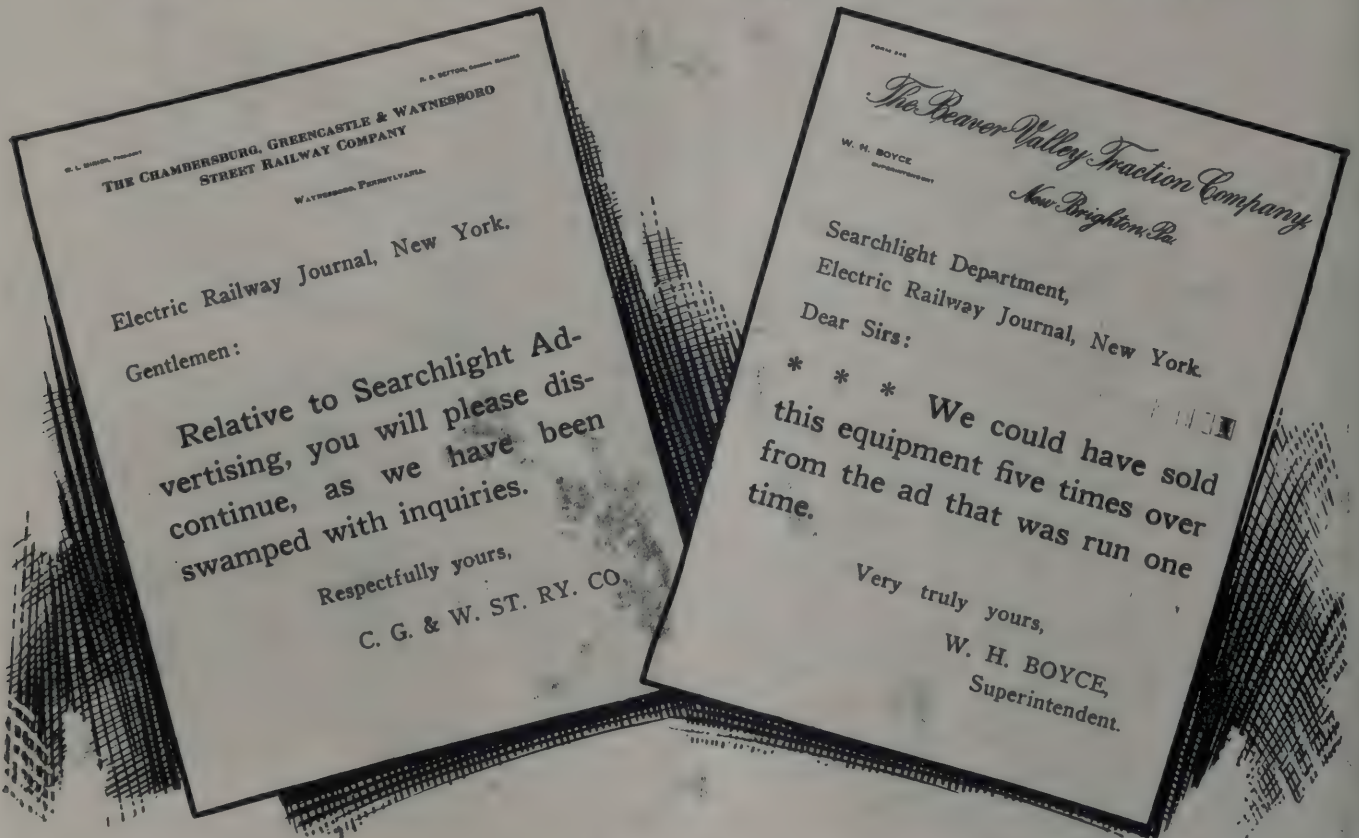
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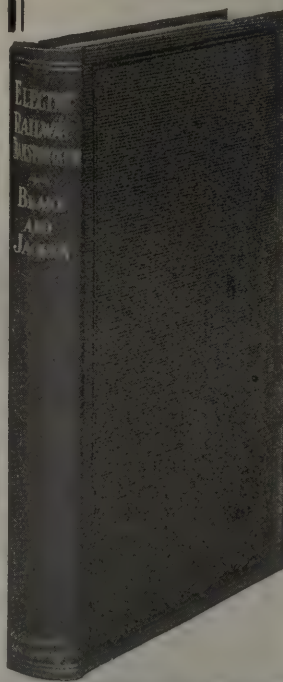
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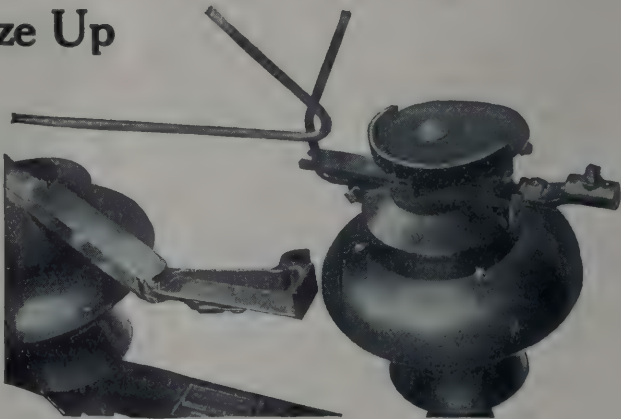
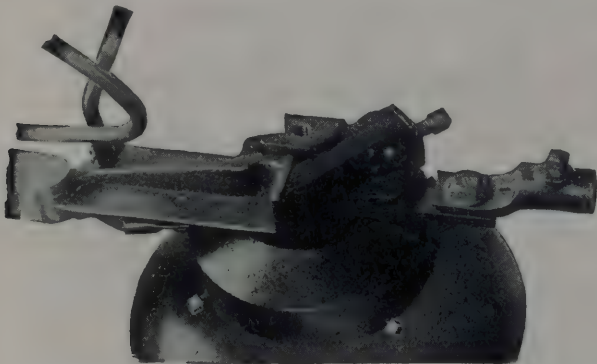
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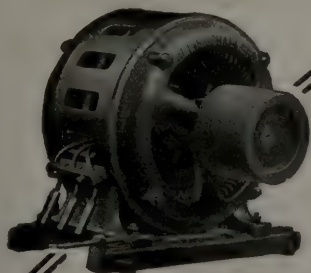
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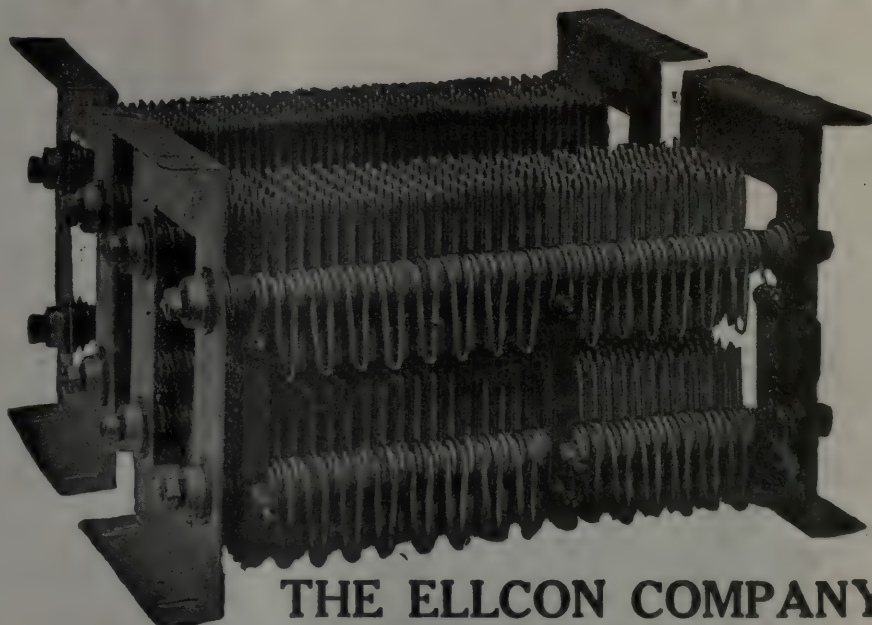
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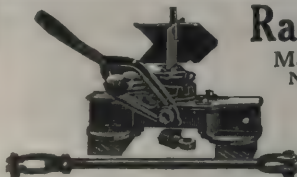


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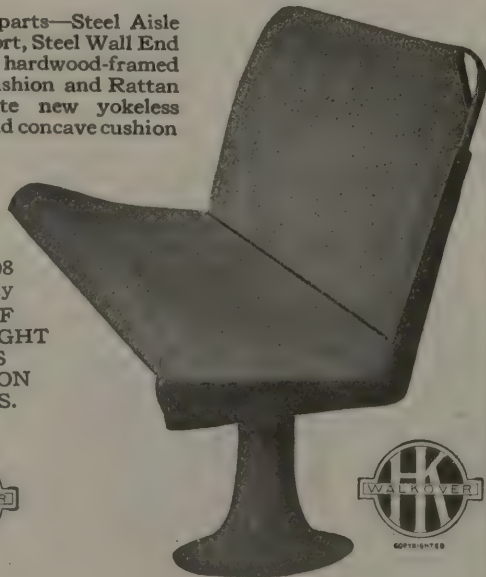
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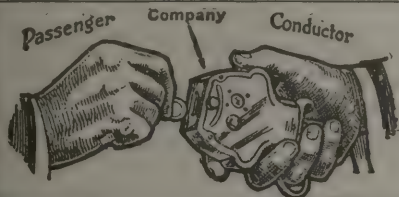
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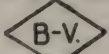
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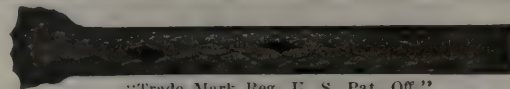
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Long Co., E. G.
Ohio Brass Co.
Wood Co., Chas. N.

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General Electric Co.
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Ohio Brass Co.
Root Spring Scraper Co.
Van Dorn & Dutton Co.

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Columbia M. W. & M. I. Co.
D & W Fuse Co.
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Westinghouse Elec. & M. Co.

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Westinghouse Elec. & M. Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.
Wood Co., Chas. N.

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General Electric Co.

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General Electric Co.
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Westinghouse Trac. B. Co.

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Westinghouse Elec. & Mfg. Co.

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Frankel Connector Co.
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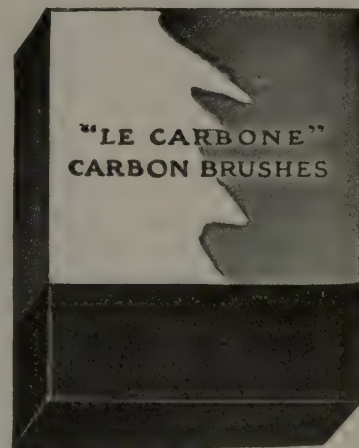
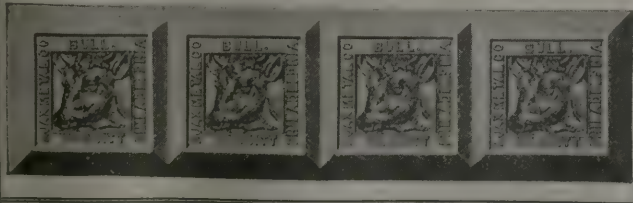
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St. Louis Car Co.

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Babcock & Wilcox Co.
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Switch Stands.

Kilby Frog & Switch Co.
Ramapo Iron Works.

Switches, Track. (See Track, Special Work.)

Switches & Switchboards.

Allis-Chalmers Mfg. Co.
Anderson Mfg. Co., A. & J. M.
Cutter Electrical & Mfg. Co.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Tampers, Tie.

Ingersoll-Rand Co.

Tapes and Cloths. (See Insulating Cloths, Paper and Tape.)

Telephones and Parts.

Electric Service Supplies Co.

Testing Clips.

Frankel Connector Co.

Testing, Commercial & Electrical.

Elec'l Testing Laboratories.
Hunt & Co., Robert W.

Testing Instruments. (See Instruments, Electrical) Measuring, Testing, etc.)

Thermostats.

Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter.

Ticket Choppers & Destroyers.

Electric Service Supplies Co.

Ties, Mechanical.

Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel.

American Bridge Co.
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross. (See Poles, Ties, Posts, etc.)

Tools, Track & Miscellaneous.

American Steel & Wire Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Hubbard & Co.
Klein & Sons, Mathias.
Railway Track-work Co.

Torches, Acetylene. (See Cutting Apparatus.)

Towers & Transmission Structures.

American Bridge Co.
Archbold-Brady Co.
Bates Exp. Steel Truss Co.
Westinghouse Elec. & M. Co.

Tower Wagons and Auto-Trucks.

McCardell & Co., J. R.

Track, Special Work.

Barbour-Stockwell Co.
Cleveland Frog & Cross Co.
Columbia M. W. & M. I. Co.
Kilby Frog & Switch Co.
New York Switch & Crossing Co.
Ramapo Iron Works.

Transfers. (See Tickets.)

Transfer Tables.

American Bridge Co.
Archbold-Brady Co.

Service



The demand everywhere is for dependable service. It should be met.

Here's one way that will help. Install B P treated gearing on rolling stock, in shops or power plants and minimize breakdowns and replacements. B P will do it because it gives 4 times the life of untreated steel gearing in identical service.

The installation of B P will assist you in giving the kind of service that it is your desire to render.

NUTTALL
PITTSBURGH **L**



Waste

in peace times is bad business
—in war times it is criminal

You can Stop It!

Now, more than ever before it is necessary to conserve your resources—*labor, materials, capital.*

Postpone laying new tracks, prevent rapid deterioration of rolling stock, cut down expenses, and add to the comfort of your passengers, by installing the

RECIPROCATING TRACK GRINDER



Removes destructive bumps, cups, and corrugations at very low cost per mile of track. Get the only genuine evidence of efficiency. Let us ship, and put a machine at work on your tracks, to prove its own case, without risk or expense to you. Wire or write.

RAILWAY TRACK-WORK COMPANY

30th and Walnut Streets
PHILADELPHIA, U. S. A.

"DUSTOOR HAI"
It is the custom

THE MORGAN CRUCIBLE COMPANY

Main Office and Factory: 519 West 88th Street, New York City
DISTRICT AGENTS: Lewis & Roth, Phila.
delphia, Electrical Engineering & Mfg.
Co., Pittsburgh, Mo. Rose Electric
Co., St. Louis, Mo. Herpes Electric
Engineering Co., San Francisco, Cal.
Hendry Co., Seattle, Wash. Charles Farn-
ham, Los Angeles, Cal.

- to use

MORGANITE Brushes

The Baldwin Locomotive Works

Philadelphia, Pa.

**ELECTRIC MOTOR
and TRAILER TRUCKS**

Collier Contracts

Will Stabilize Your Income from Car Advertising

A great many economic ups and downs can occur in a decade. Take the years 1907-1917 for example.

Isn't it a fine thing to be able to do business with an organization which makes good to the letter on its contracts without worry to the party of the first part?

This is exactly the condition enjoyed by railways which have contracted with Barron G. Collier, Incorporated, because they have signed up with an organization—

Whose resources and nation-wide connections absorb inequalities in the flow of revenue from car card advertisements, as a storage reservoir absorbs inequalities in the flow of water from its source.

Barron G. Collier
INCORPORATED

Candler Building
220 West 42nd Street, New York City

Gurney-equipped

THOROUGHLY MODERN

in every respect, with electric motor drive, push-button control and all belting enclosed, this husky machine has ample capacity to drive a 5-inch high-speed drill thru steel at the limit of the steel's efficiency—capacity enough to drive a 14-inch boring tool in steel or cast iron.

Baker Brothers, of Toledo, Ohio, who manufacture this machine, describe the application of Gurney Bearings as follows:

"The entire driving mechanism is mounted on the highest grade of annular bearings obtainable. We have been using ball bearings for a number of years in the construction of our heavy machines, and their efficiency, as well as durability has been fully demonstrated. They not only require less attention and repairs than bronze, but in addition maintain the accurate alignment of the gearing."

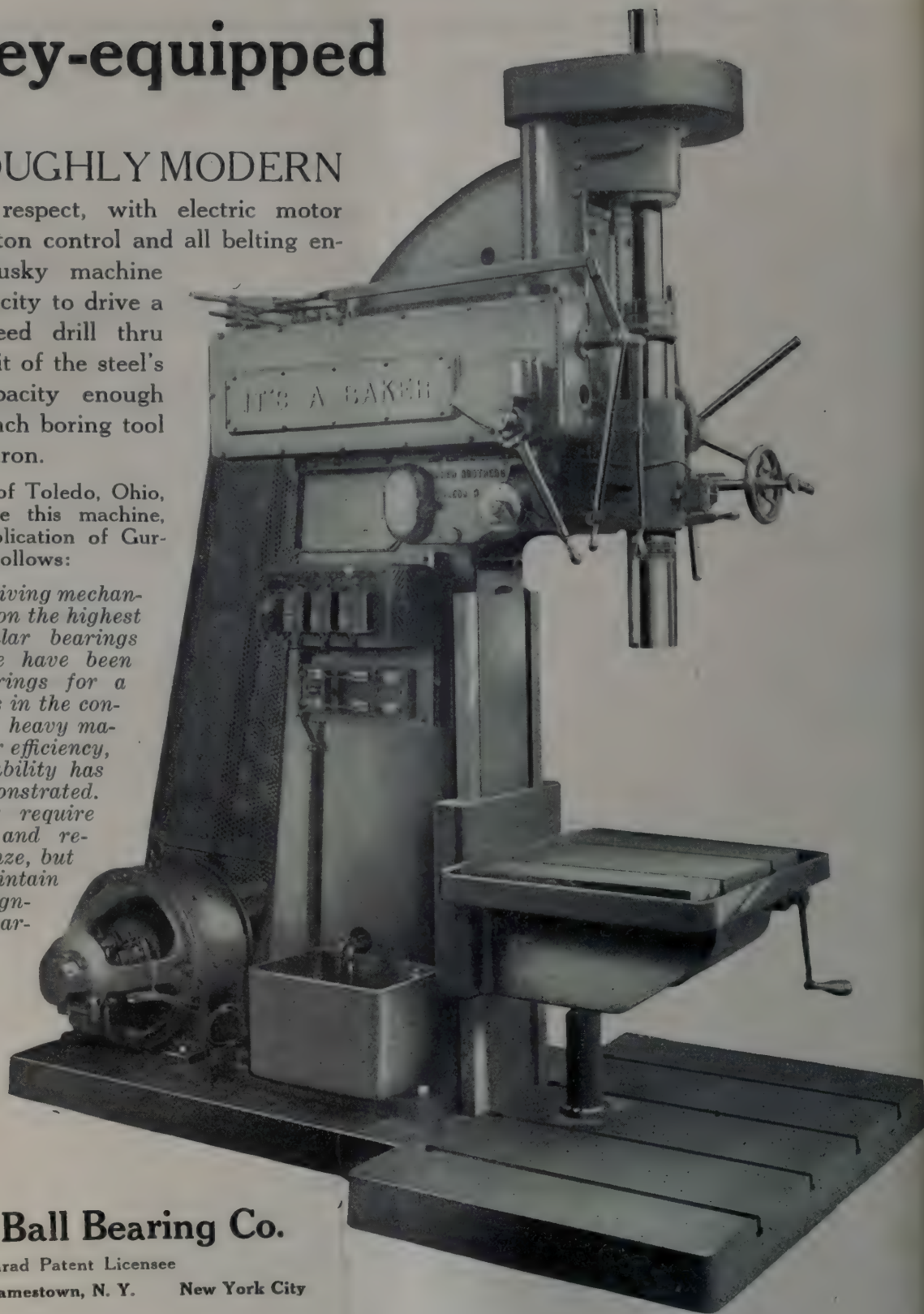


Gurney Ball Bearing Co.

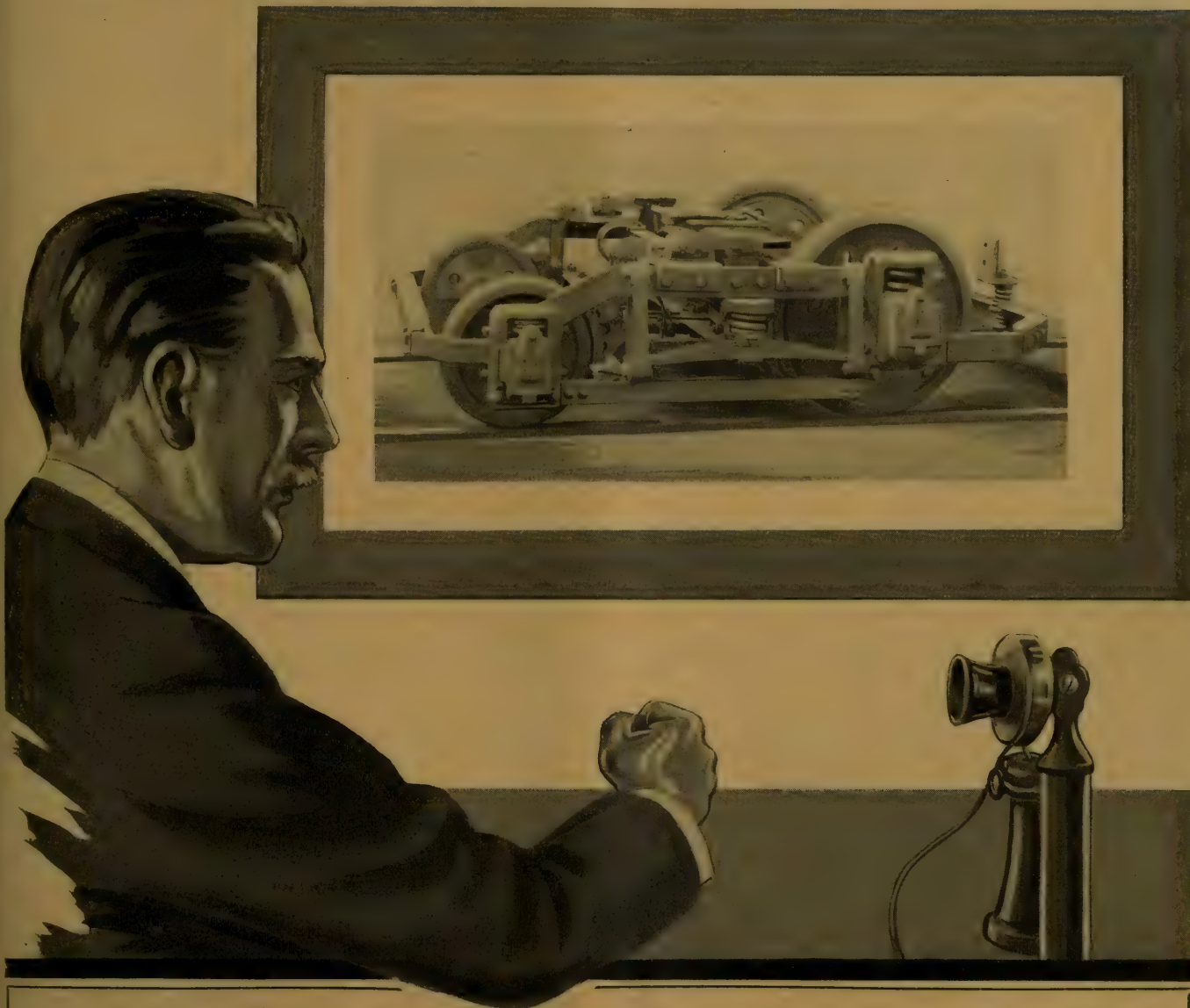
Conrad Patent Licensee

Chicago, Ill. Jamestown, N. Y. New York City

189



GURNEY




The General Manager is Satisfied

"I am absolutely convinced that these Brill 39-E trucks with their extra set of easy acting springs for light loads and their floating bolster are largely responsible for the better results we are getting. With the help of publicity the public readily appreciates a real improvement and we never had a better publicity subject than our easy riding cars."

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS





This 12,500-kw. Curtis Steam Turbine Generator was recently installed in the Reeves Avenue Station of the Norfolk Railway and Power Company, Norfolk, Va.

Curtis Steam Turbines are furnished in sizes ranging from 1 to 50,000 kw.

CURTIS TURBINES

LINKED
TOGETHER

ECONOMY

RELIABILITY



General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities



Experience with the Front-Entrance, Center-Exit (Pay-as-you-Pass) C

ELECTRIC RAILWAY JOURNAL

New York, January 19, 1918

McGraw-Hill Company, Inc.

Vol. 51, No. 3

10c a copy

1,000,000 fares a day deposited
in Johnson Fare Boxes



MORE than one hundred—100—street railways in America entrust to the Johnson Fare Box the work of collecting over \$100,000,000 in fares each year.

The Johnson Fare Box furnishes the dependability demanded by fare collection experts.

The electrically driven Johnson Box shown on this page is

but another adaptation of the standard coin and metal ticket boxes used by many roads.

It is here shown in service at one of the important Stations of the New York Municipal Railway Corporation.

Remember the slogan and success of Johnson Fare Boxes is "Dependability".

Johnson Fare Box Co., Chicago, Ill., U. S. A.



Dixieland Meets Demand



The South is handling immense and numerous cantonment problems, and has adjusted her various institutions to the same pace as that set by the government in meeting war-time necessities.

The Columbia Railway, Gas & Electric Co. operate trains for moving troops to and from the National Army Camp, Camp Jackson, where 45,000 men are being turned into soldiers.

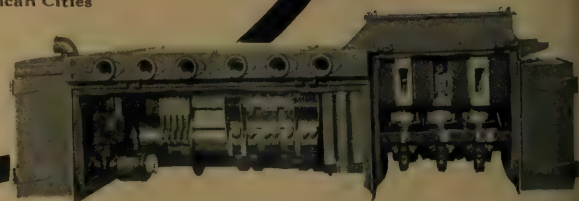
The cars are equipped with Westinghouse No. 306-CV Motors and Type HLD Control, and are of the latest steel design, some of which were built in the railway company's shops in Columbia, S. C.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Sales Offices in All Large American Cities



No. 306-CV, 65 HORSEPOWER MOTOR



TYPE HLD CONTROL BOX

Westinghouse

Electric Railway Journal

H. W. BLAKE, *Editor*

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Power


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ordered the new and the old address must be given.
Notice must be received at least ten days before
the change takes place.

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Second Class Mail.

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Westinghouse-Cleveland Trolley-Wire Splicer



For the past nine years
the Westinghouse-Cleve-
land Splicer has been
specified by many line
superintendents.

Why?

Because it is easily and
quickly installed, is
neat in appearance,
and adds to the
strength of the
trolley wire.

The Cleveland
Splicer was first
put on the market
by the Westinghouse
Electric Co. in 1909. It
had such an immediate suc-
cess that it was widely copied.

Late improvements make the
"Westinghouse - Cleveland" the
latest word in splicers. It is a
sound investment to have on the
tower wagon. It is both an
emergency and a permanent
splicer, and will last longer than
the trolley wire.



WESTINGHOUSE
ELECTRIC

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Meet the Wear at Its Source

That's what we do when we build into our air brakes those wear-resisting qualities obtained only by use of best designs, best materials and skilled workmanship. We weave into the fabric itself the element of enduring quality.



Brake Building our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.
Boston, Mass.
Chicago, Ill.
Columbus, O.

Denver, Col.
Houston, Tex.
Los Angeles, Cal.



Mexico City
New York, N. Y.
Pittsburgh, Pa.

San Francisco
Seattle, Wash.
St. Louis, Mo.
St. Paul, Minn.

Phono-Electric

The Breakless Trolley Wire



The Puget Sound Electric Railway, Light & Power Company began to put up No. 00 round Phono-Electric Trolley Wire on curves as early as 1911.

Although Phono-Electric was put up at the hardest-wear places, only one break has been reported in six years—

And that break was found to be due to a faulty splice!

Users of Phono-Electric do not hesitate to refer to it as "The Breakless Trolley Wire."

Bridgeport Brass Company
Bridgeport Connecticut



O-B Trolley Retrievers Keep in Working Order

Every time the wheel leaves the wire, there is a heavy blow delivered to the retriever.

O-B Retrievers can stand this constant battering successfully. Their parts are few and strong.

Experience on many roads has shown that they work continuously. That they stay on the car and keep out of the shop.

Shall we arrange for a free trial on your cars?

The Ohio Brass Company
Mansfield, Ohio

New York

Philadelphia

Chicago

Los Angeles

San Francisco



Penetration

These two products have proved their superiority

The success of this company is due above all to one thing—*dependable quality*. Every Reilly product—from first to last—has been made to do its work *better* than it could be done by any other product known to science.

Reilly creosote oils have never been by-products of the production of other materials. Hence it has been possible for us to turn out products that were both *uniform* and *perfect* in quality.

For this reason, our two most recent and most meritorious products have received generous and serious consideration on the part of those interested in the preservation of wood.

Reilly's Improved Creosote Oil

(PATENTED)

The finest fruit of over twenty years experience. Superior to any previous creosote oil for use with the empty cell process.

Absolutely free from the volatile oils, coal tar or other adulterants. Contains more than *three times as much* permanent properties as the next best oil. At 250 degrees C. less than 1% distills. And at 315 degrees C. more than 75% remains undistilled. So permanent is its nature that it *stays in the wood forever*.

Reilly's Wood Preservative Oil

(PATENTED)

By far the best creosote oil ever produced for open tank or brush treatment. Produced by a patented process that gives this oil a much *higher boiling point* than any other pure creosote oil product.

Freedom from the volatile oils and precipitates gives it deepest and most *permanent* penetration.

Absolutely proof against the action of heat, cold, drought, water, decay and insect attacks. It coats the surface and fills the wood structure with an impermeable mass of permanent oil. We have the goods and can make prompt shipments. Especially good delivery in tank cars. Write for prices and samples for test. No other refinery is manufacturing these grades of creosote oil as our process is patented.

Republic Creosoting Company

Indianapolis, Indiana

PLANTS: Indianapolis Minneapolis Mobile Seattle

Permanence



Is Your Track Trench A Public Drain?

Obviate This Difficulty by Using

INTERNATIONAL STEEL TWIN TIES

Do you appreciate that the bottom of a ballasted track trench is the lowest point in a paved street? Drainage from the pavement subgrade, the parking and lawns seek this low level. Conditions are ideal for drainage purposes in the porous ballast.

A tile drainage system helps for a while. But soon fills up with silt and becomes useless. And this at a time when you need perfect track drainage most. Is it any wonder that ballasted track in paved streets just won't "stay put" after a few years?

A concrete foundation is the only sure remedy. It's expensive but there is only one way to keep its cost within reasonable limits. Use International Steel Twin Ties. With one-half the excavation, concrete and labor usually required with other types of construction, you can obtain better results. Steel twin ties put all the material in effective bearing. They save the material wasted in wooden tie track.

Ask the Users and Then Send Us Your Order.

Prompt Deliveries Made from Stock.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

Western Eng'g Sales Co., San Francisco, Cal.
Los Angeles, Cal.

Seattle, Wash.

R. J. Cooper Co.,
Salt Lake City, Utah.

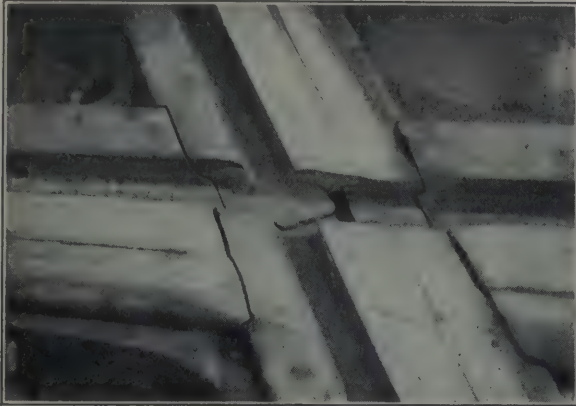
J. E. Lewis & Co.,
Dallas, Texas.

Maurice Joy,
Philadelphia.

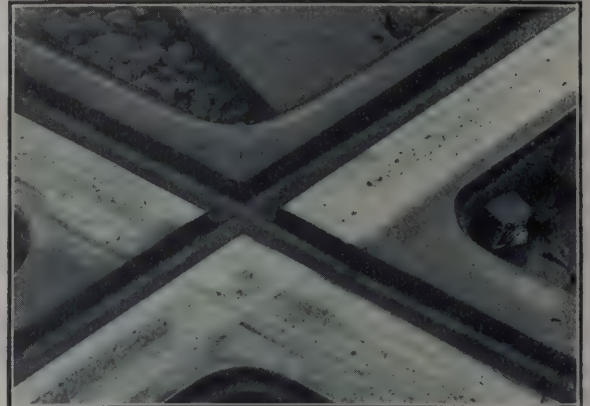
William H. Ziegler,
Minneapolis, Minn.



Permanent Track at Less Cost
Any Type Base — Open or Paved Track



What Happens to a Rolled Rail Crossing



How a Balkwill Crossing Behaves

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of a rolled rail crossing are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill articulated cast-manganese crossing the difficulty is

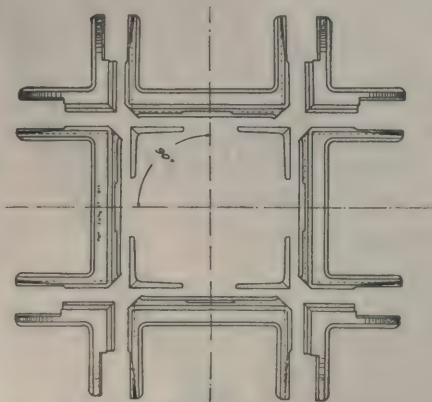
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill crossing. Therefore the Balkwill crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.

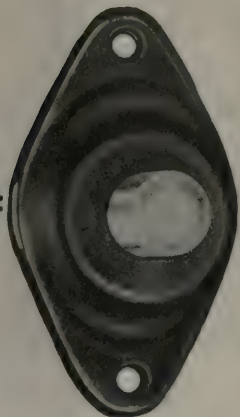


Joints at the flangeway intersections of
Balkwill Crossings positively eliminate
breakage

Order Balkwill Crossings
Direct from Your Special Work Manufacturers

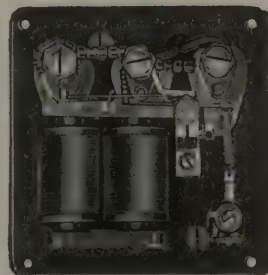
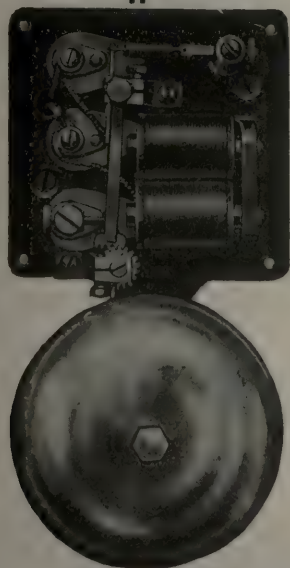
The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio



Don't Use Batteries

The assurance of continued operation of signals and the elimination of the cost of batteries fully warrant the installation of Faraday High Voltage Car Signals on every car. Descriptive matter at your request.



ELECTRIC SERVICE SUPPLIES CO.

Railway Material and Electrical Supplies

PHILADELPHIA, 17th and Cambria Sts.

NEW YORK . . . 50 Church St.

CHICAGO . . . Monadnock Building

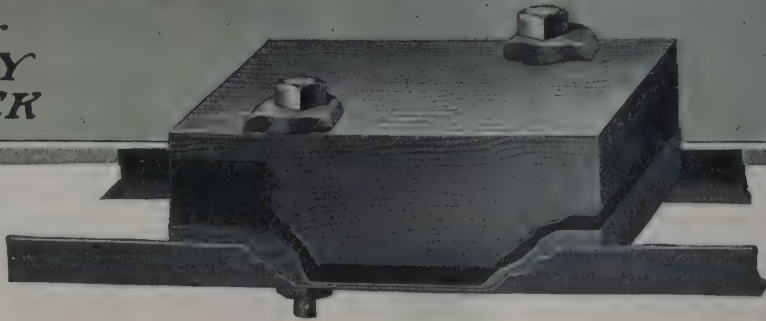
Lyman Tube & Supply Co.
Canadian Agents



The MECHANICAL RAILWAY TIE

For
CITY
TRACK

For
INTERURBAN
TRACK



Mechanical Ties Are Economical Because Permanent



The above photograph shows Mechanical Ties attached to rails. The track has been blocked up to the desired level and the pouring of concrete exactly as in ordinary paving is all that remains to be done. Could anything be simpler? Could any result be more substantial?

The proper selection of ties for any kind of track is so serious a matter that the issue should not be permitted to become clouded by the entrance of first-cost considerations into the problem.

As a matter of fact, Mechanical Ties cost, installed, very little more than ordinary wood ties; but even though they cost twice as much at the outset they would still be by far the more economical in the long run.

Mechanical Ties are permanent. They will outlast the pavement. Once installed, they give no trouble and require very little, if any, attention.

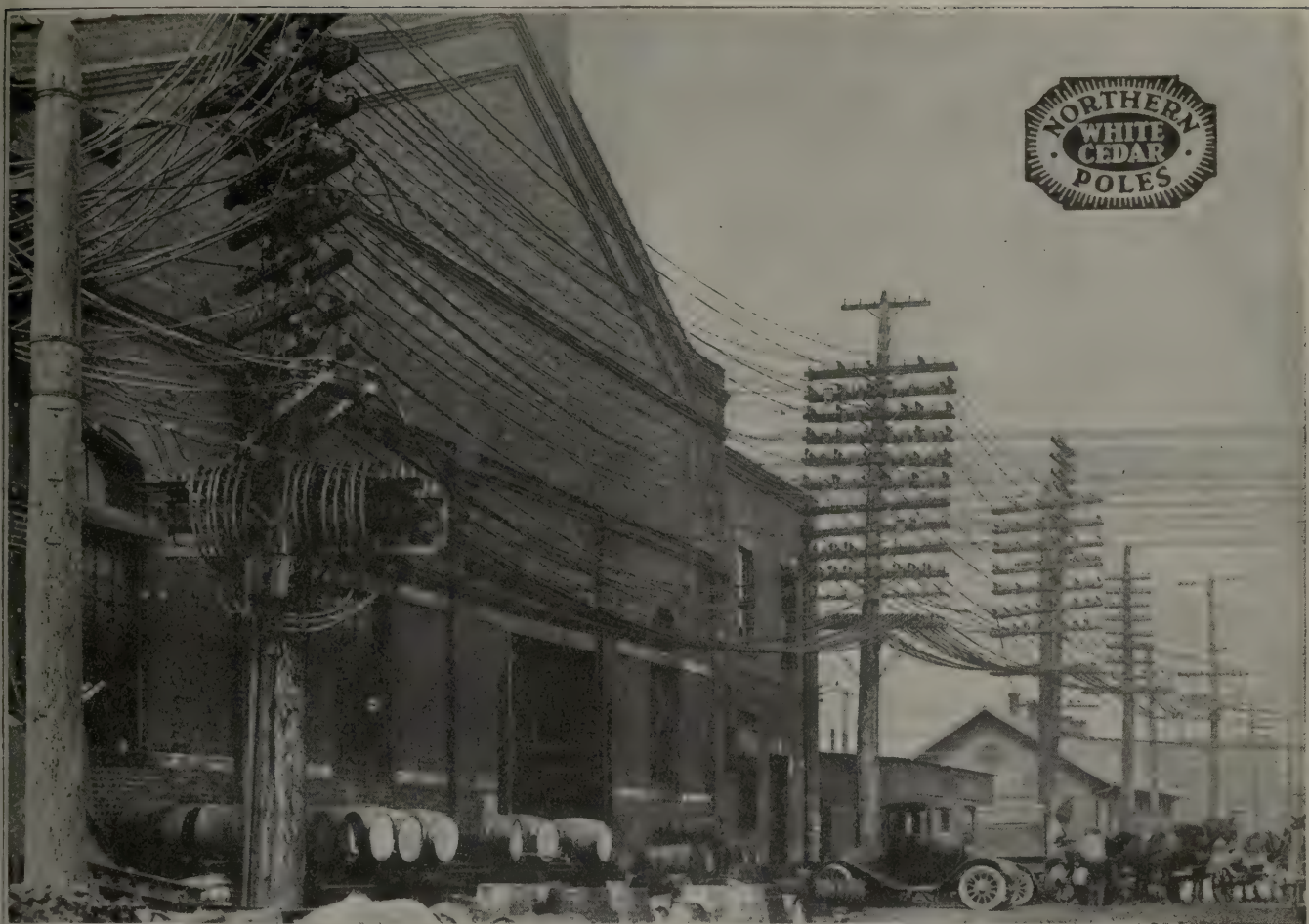
They are substantially made and provide all the strength and permanence that steel embedded in concrete can give. Yet they are extremely resilient, due to the wooden rail support which is cushioned with asphalt.

Your inquiry for full particulars regarding Mechanical Railway Ties will be a step in the direction of better economy. Write today.

THE DAYTON MECHANICAL TIE CO.

201 Third Street Arcade
DAYTON, OHIO

Provides the Desirable Qualities of Wood Plus the Strength of Steel, the Permanence of Concrete and the Resiliency of Asphalt— A NonConductor of Vibration



Speaking About Heavy Loads
Look at These

Northern White Cedar Poles

Here is the data:

Location—Lines of the Columbus Railway Power and Light Company; Columbus, Ohio; at the power house on West Spring Street.

Kind of Poles—40 foot Northern White Cedar.

Year Poles Were Set—1898

No Replacements

Condition of Poles—Good

Note that these poles have been in service over 19 years. All the strength you want in a pole is in Northern White Cedar.

*Sold under Northern White Cedar Association Specifications
which insure a high standard of quality*

Load Supported—

21—500,000 C. M. W. P. Stranded

2—300,000 C. M. W. P. Stranded

5—250,000 C. M. W. P. Stranded

25—4/o W. P. Solid

4—3/o W. P. Solid

All Copper

Northern White Cedar Association, Lumber Exchange,
Minneapolis

Every Blow Costs YOU Money

A recent analysis of way department maintenance expenses showed that

34.8 per cent of the total expenses were chargeable to pavement, and that

26 per cent of that amount was chargeable to pavement repairs at repaired joints!



GOLDSCHMIDT THERMIT WELDS

offer the only practicable way to secure
a continuous rail permanently

They give 100% conductivity and, what is equally important, retain the full strength of the rail.



They settle the bonding question "for keeps" and the operation in no way changes the composition or wearing quality of the metal in the head of the rail.

Goldschmidt Thermit Company

120 Broadway, New York

329-333 Folsom St., San Francisco
7300 So. Chicago Ave., Chicago

103 Richmond St., W., Toronto, Ont.
1427-1429 Western Ave., Pittsburgh



Stop Worrying About Your Culvert Drains

Do the way thousands of progressive officials and engineers are doing. Install

"ARMCO" IRON CULVERTS

Then give your time and thoughts to something else. The construction of "Armco" Iron Corrugated Culverts is in keeping with the material employed. Seams are tightly and evenly cinched and the pipe is straight and true. All sections are full weight, full diameter and full riveted. Every detail is cared for in a workman-like way.



Resists Rust

The triangle brand is your guarantee that they are made from THE IRON THAT'S MADE TO LAST.

Write the nearest manufacturer for full information on Rust-Resisting "Armco" Iron Flumes, Culverts, Siphons, Sheets, Roofing, and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
E. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neill Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.
Iowa, Independence
Independence Corrugated Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Baltimore
Wm. M. Baker, Munsey Bldg.
Massachusetts, Palmer
New England Metal Cul. Co.
Michigan, Bark River
Bark River Bridge & Cul. Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Michigan, Bay City
U. S. Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.

Montana, Missoula
Montana Culvert & Flume Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North-East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Cul. Co.
New York, Auburn
Pennsylvania Metal Cul. Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Wks.
Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Cul. Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal & Boiler Works.
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.
Virginia, Roanoke
Virginia Metal & Culvert Co.
Washington, Spokane
Spokane Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Cul. Co.

Canada: Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary.

You have sent your SONS
to fight for humanity—

*Now send your MACHINES
to fight for your Sons*

Shall we lose 50% of the boys we send "over the top" in France?
Or shall we lose 5%?

The answer *right now* lies with the owners of machine tools. They—and they alone—can *now* give the government the means of providing heavy artillery for the boys at the front.

Without heavy artillery we will lose every other man. With the artillery, we will lose one man in twenty.

Readers of the Electric Railway Journal have an opportunity here to perform a very serious and necessary volunteer service.

Somewhere in the country these machines are at work. The government needs them to make heavy guns. There is no longer time to build new tools. Either we must have the tools *immediately* or we pay for their lack with the lives of our boys in France.

You readers of the Electric Railway Journal—some of you are associated with shops where these machines are now at work. Some of you associated with power stations, know where they are located. Help the government *now* to secure these life-saving machines. Go to their owners and urge the *instant* need of patriotic co-operation.

CONDITIONS

Machines will be bought at a fair price, or arrangement made for their return after the war.

Telegraph

State which machine tools can be secured at once—which within 30 days.

The MACHINES Needed—

60 x 60 x 20-ft. planing machines.
48 x 48 x 20-ft. planing machines.
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Nos. 4 and 5 plain milling machines.
Nos. 4 and 4 vertical milling machines.
30-in. x 20-ft. engine lathes.
36-in. x 20-ft. engine lathes.
4- and 5-ft. radial drilling machines.
18- x 130-in. cylindrical grinding machines.
10-ft. vertical boring mills.
5-ft. vertical boring mills.
6-in. floor type, horizontal boring and milling machines.
4-in. floor type, horizontal boring and milling machines.

Council of National Defense

Machine Tool Section of the War Industries Board **Washington, D. C.**



Have You Read This Bulletin?

If you haven't, you are overlooking a valuable treatise on the economical operation of electric cars.

It sets forth the fundamentals of energy saving through metering the energy used. It goes right to the root of the problem, attacking it with a logical clearness and conciseness that is easily understood, and will be readily appreciated.

It shows the advantages of proper acceleration, coasting, braking, etc., and points out how substantial savings in power may be effected by use of the ECONOMY METER—The "Watchdog of Your Power."

This bulletin is short and to the point. You will find it well worth reading. Write for a copy. Ask for "Economical Operation of Electric Railway Cars."



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ECONOMY ELECTRIC DEVICES Co.

EXCLUSIVE SALES AGENT

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The Best Service

Education of Public Opinion

*—these are the Keys to Prosperity
for the Electric Railway Industry*

IF a manufacturer of trolley wheels or any other electric railway equipment were confronted by a total lack of confidence in him, on the part of 99% of electric railway officials, how successful would his business be?

What difference would it make how honest his intentions, how sound his integrity, how efficient, valuable or rea-

sonable in price his product, so long as this state of mind existed with the vast majority of his possible customers?

What would be the first absolutely essential thing for this hypothetical manufacturer to accomplish if he ever expected to do a profitable business?

Can there be two opinions as to that?

Would not the one vital overshadowing necessity be for him to change the

state of mind of his customers, to secure and hold their confidence?

From the standpoint of continuously profitable business the electric railway industry is as completely in the hands of the general public as this hypothetical manufacturer would be in the hands of electric railway officials.

The ability of the electric railway industry as a whole to do a profitable business depends absolutely on the state

of the public mind toward that industry.

And the state of the public mind toward the industry today is largely antagonistic.

Until bankruptcy overtakes it the industry can go on giving increased luxury of service, carrying an increased burden of taxes, and submitting to actual or relative reductions in fares, without in the slightest changing the mental attitude of the public.

THE only thing which will change the public's mental attitude is education. And the only thing which will keep that attitude favorable is the best service.

Not only must the public be educated from the standpoints of reason, logic and self interest. It must be appealed to **emotionally** through its passion for fair play, justice and good sportsmanship.

It must be manifest to any thinking man that it is as essential for the industry to make a business of securing public confidence and good-will as it is to continue the business of running cars.

To effectively accomplish this, however, it is absolutely essential to use every method that can assist in giving speedier, prompter, more comfortable service, or that can lower the cost of operation.

The task here of the electric railway company is not essentially different or more difficult than that of the average

manufacturer in any line of business.

The private manufacturer as well as the public service company in order to do a large and continuously profitable business must provide a commodity at least equal in value or efficiency to any competing product. And he then must convince his buying public that he does provide this quality and efficiency.

It is being demonstrated every day that wherever any community is convinced that its railway service is equal to or better than anything else offered at equal cost the public will use it gladly and pay for it cheerfully.

The opportunity for successfully and profitably selling public service transportation is greater now than ever.

To exploit that market is merely a matter of scientific manufacturing, service and good salesmanship.

Electric Railway Journal

Tenth Avenue at 36th Street, New York

Member Audit Bureau of Circulations



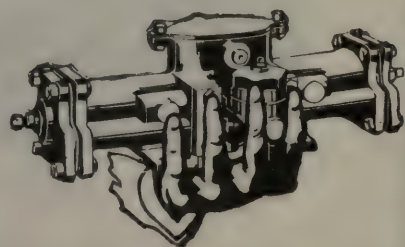
National Pneumatic Door and Step Control At Cleveland

This picture shows that the Cleveland Railway uses its very latest car—the Peter Witt front entrance, center-exit type in the intensive service on the short stretch between the Public Square and the steamer piers.

This line is particularly busy in summer when many of the passengers are encumbered with traveling bags and suit-cases.

The speedy loading and unloading natural to this design of car is accelerated by the use of

National Pneumatic Door and Step Control.



NATIONAL PNEUMATIC COMPANY



50 Church St. New York

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Because of the Critical Coal Situation NOW is a PECULIARLY Favorable Time to Install the Arthur Power Saving Recorder

There is no device—be it meter, coasting recorder or any other recorder—which automatically, of itself, reduces power consumption on trolley cars.

The value of any such mechanism is in recording the comparative efficiency of the car crews.

The actual dollars-and-cents value must come from the endeavor of car crews to perfect their individual records.

The mechanical device employed, therefore, no matter what its type, is simply an essential to securing the co-operation of your men in the correct and economical operation of cars.

At the present time every argument you could use with your men to secure their co-operation is doubled in its force by their knowledge of the



Showing recorder location on one of the 1200 cars of the Connecticut Company

National Necessity to Save Coal

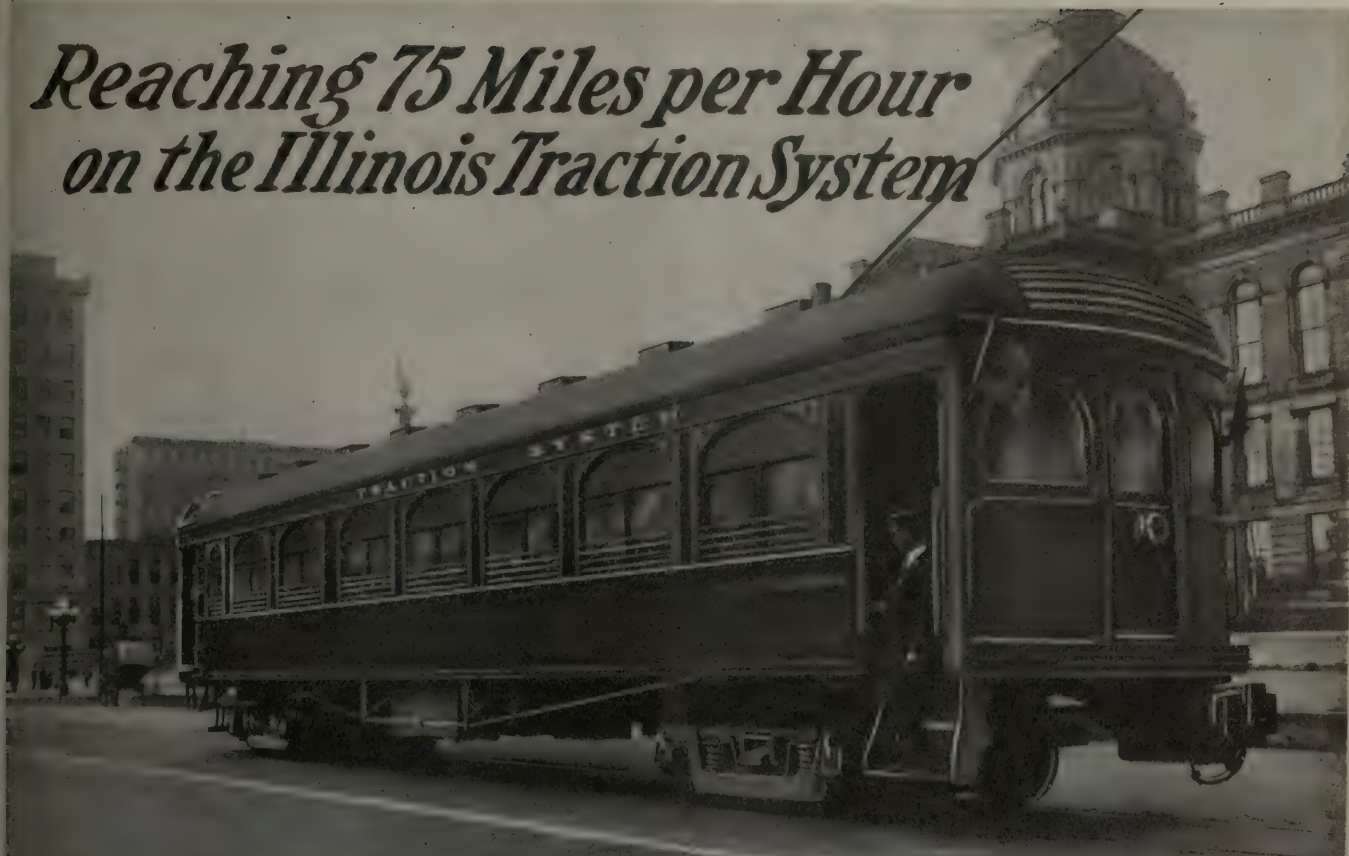
The appeal to the patriotism and public spirit of your men will, under present conditions, bring results that under ordinary circumstances might never be achieved.

The Arthur Recorder is simple, and your men can easily and quickly understand its workings and value.

"Power wasted at the brake shoes is the true measure of the motormen's relative efficiency."

The Arthur Power-Saving Recorder Co.
New Haven, Conn.

Reaching 75 Miles per Hour on the Illinois Traction System



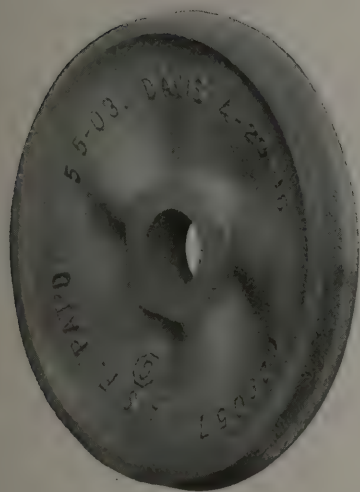
DAVIS STEEL WHEELS

The high speed interurban cars of this great system maintain fast schedules throughout the State of Illinois.

The punishment meted out to their wheels admits of no temporizing.

Safety demands the best—they use the Davis One Wear Manganese Steel Wheel.

The more complete your investigation in the interests of safety and economy the greater will be your conviction: The Davis Steel Wheel is



The Standard
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AMERICAN STEEL FOUNDRIES

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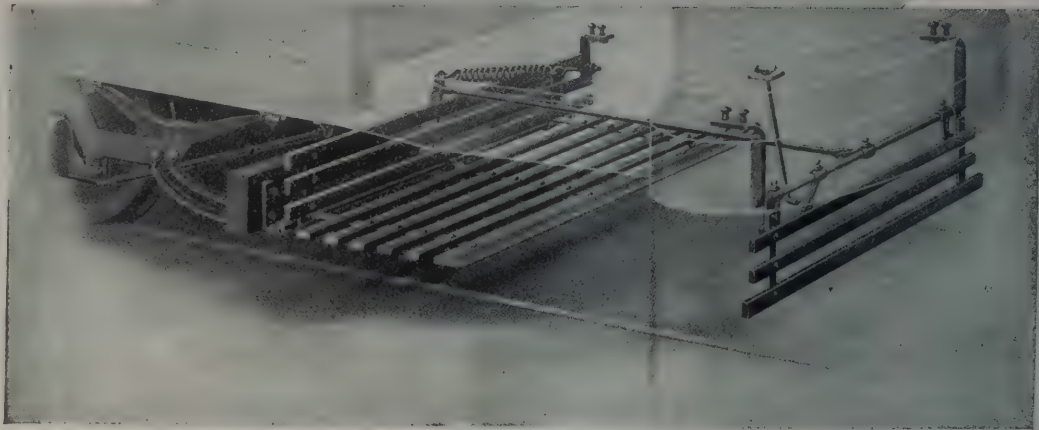
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Because the careless are lifted out of harm's way quicker than thought.

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PHILADELPHIA—the Cradle of American Independence, the center of social and political life, during the Revolution. The home city of the great Franklin.

A Hundred Years After

the Liberty Bell had sent forth its sonorous notes over the city, a great exposition in Philadelphia drew to its hospitable homes hundreds of thousands of visitors from all over the world.

At that time the public had enjoyed a sufficient taste of public service transportation to appreciate its possibilities and to clamor for more.

One of the earliest answers of importance to this demand for better facilities was made at the time of the Exposition in Philadelphia by the installation of a cable line on Market

Street. It was about this time that the era of public service in rapid transit began. A service that has probably been more potent than any other factor in the rapid growth of our cities.

It is a service that has developed suburbs. Increased land values. Accelerated commerce. Improved conditions of social life. Enormously added to public comfort and convenience. In short, the value to the nation of modern rapid transit facilities in cities and towns could hardly be overestimated. Throughout this whole period of historic progress

Galena Oils

and Galena Service have contributed to the economical and efficient operation of railways in a proportion similar to the part which urban and inter-urban railways have played in the development of the communities they serve and the districts through which they run.

Galena-Signal Oil Co.
Franklin, Pa.



ERICO Portable Welder For Rail Bonding For Arc Welding

The new parallel type rheostat complete weighs only 141 lbs. and when not in use with the bonding outfit can be used for general arc welding work. The switches allow a current regulation of from 60 to 200 amperes on a 600-volt line. **Write for Prices.**

The Electric Railway Improvement Co., Cleveland

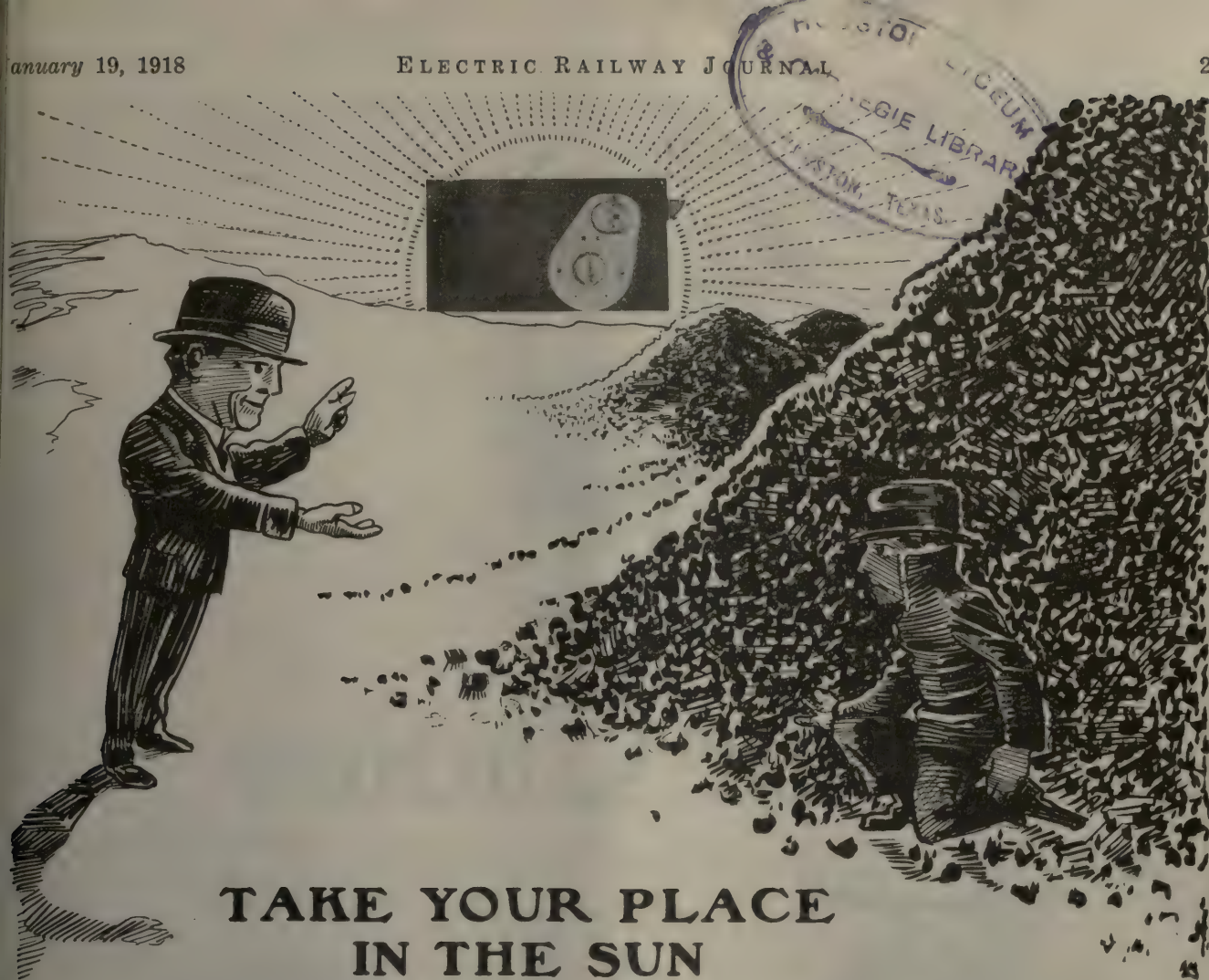


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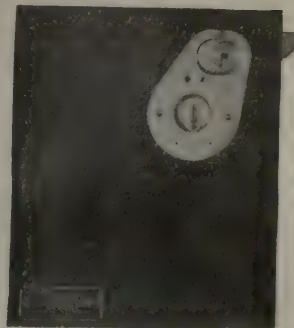
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Don't stay any longer in the gloomy shadows cast by the high cost of coal. Use the

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which has proved on thousands of cars in city, suburban, interurban, subway, elevated and electrified steam service everywhere that it

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Time is the Essence of Railroading

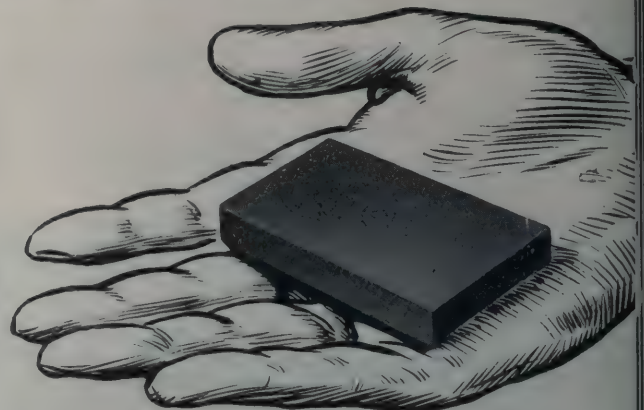
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61 BROADWAY, NEW YORK



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A little care and forethought in selecting the carbon brush for your motors will be repaid by the absence of commutator troubles.

G-E Brushes

are available in grades to suit every condition.

Our specialists will gladly select the proper brush after studying your particular condition and equipment.

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Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, January 19, 1918

Number 3

The Electric Railway Industry Needs Greater Coherence

IT WAS Benjamin Franklin who during our struggle for independence made the famous remark about hanging together or hanging separately. The same remark applies to-day to the electric railways, and unfortunately some are already beginning to "hang separately." The war is acting as a tremendous force in shaking up all industries to make them exert their maximum effort to bring it to a successful issue. Unless an industry can demonstrate that it is directly or indirectly essential to this end it will fare ill at the hands of the public until the war is on. The war then forces the electric railways with other industries to pull together, first to demonstrate to the government their essential character, and second to enable them to give a service commensurate with the needs of the hour. An intelligent fear of what will happen if the war be not won is an influence for unity throughout the whole country which must prove overwhelming.

But electric railways have more than the war to influence them. They must unite to impress the public with the necessity for increased income and to learn how to give a twentieth century transportation service. Organically this is not an easy thing to do, for the reason that the industry is made up of many individual units which have little in common. They are individually strong on what are termed "local conditions," which make it seemingly difficult for one company to co-operate with others. But through organization local conditions can be overcome.

The first step is to use more effectively the organizations already available in the national and sectional associations. The second is to supplement these, if they are not adequate for the work. The third is for each company to feel a responsibility not only for its own welfare but for that of other railway properties. There are unlimited opportunities for good if the energies of all branches of the industry—operating, manufacturing and financial—are united.

Reduced Schedule Speeds in Detroit

THE chart which we printed in our news columns last week, showing a constantly decreasing schedule speed for cars in Detroit since 1910, discloses a condition which is very serious, if it is at all general. According to this chart, the average schedule speed of the Detroit cars has decreased during the last seven years from 9.6 m.p.h. to 8.5 m.p.h. The fact that the managers of the Detroit Railway published this chart in their company publication shows that they realize the situation and are doing their best to correct it. We recommended that other companies make a similar record to determine whether the average schedule speed of their cars is also falling, and if so to take immediate action toward a change.

A lower schedule speed means less attractive service, larger investment in equipment and higher operating costs. Thus it is objectionable to both the patron and the company. In thinking of schedule speed, one should keep clearly in mind that it does not vary with maximum speed. Indeed, it is often possible to increase schedule speed and decrease maximum speed. Schedule speed is largely under the control of the authorities and the management, but maximum speed is largely a question of the freedom of the streets from vehicles.

There is no doubt that present-day urban conditions

tend to reduce the schedule speed of cars unless heroic efforts are made to overcome this tendency. There is increasing interference from vehicular traffic and foot passengers, caused by the greater volume of traffic on the street, and these necessitate non-passenger stops and slowdowns for the cars, which are exasperating and expensive. But if vehicular and foot-passenger congestion on the street is a necessary accompaniment of the growth and business activities of a city, one may naturally ask what can the railway do? The answer is this: Educate the public and the authorities to two facts.

The first of these is that high schedule speed is not only the foundation of good service, but it is also the

Uncle Sam Must Have MACHINE TOOLS

The federal government faces a momentous contingency in regard to the manufacture of heavy field artillery. Big guns must be had, in large numbers and promptly. But it takes time and tools to make them with. The government is short of both and machine-tool makers cannot supply the tools in time to prevent heavy slaughter of our men in the campaigns of 1918. The tools must be taken from the shops where they are not in use directly or indirectly on work necessary in the winning of the war. Electric railway operators and manufacturers of supplies can do something to help in this emergency. Some suggestions are given on page 137. Read these, if you skip everything else in this issue.

foundation of economical service, and if a company can operate economically it can introduce improvements which it otherwise could not supply. The second is that the railway cars should not be held down as regards schedule speed and even maximum speed of cars in streets to the standards of thirty years ago, because the standards of speed as well as of service have changed during that time.

If these facts are understood, the railway company should get the co-operation which it needs from both the authorities and the general public for introducing longer spacing between stops, rerouting reforms for its own cars and even restrictions on the use of certain streets by vehicles, all in the interest of higher schedule speed and better electric railway service.

Public Speed Standards Have Changed in Thirty Years

IT is a noticeable fact that each advance in the art of urban transportation has been accompanied by an increase in speed. In its early days the horse car itself made better time than the rumbling, creeping bus, in part probably because of its higher rate of acceleration and because the cars were lower and easier of access. Hence the time of passenger interchange was less. Then the horse car was succeeded by the electric car, which although first built on the model of its predecessor was faster because of a higher accelerating rate and higher maximum speed. Later improvements in car body design and equipment still further greatly reduced the time of passenger interchange as well as increased the rates of acceleration and braking, although these improvements have been counterbalanced, at least in part in many cities by a reduction in schedule speed from street congestion and other causes. This brings us to the present day.

Under existing urban conditions even the fastest electric railway car seems slow in comparison with the automobile. It is this latter vehicle which now sets the pace on the streets, and this pace is a fast one. The electric car must compete with it in schedule speed, if it is to do its full duty to its patrons. The average rider will forget all considerations of safety and comfort as well as of justice to vested interests if only he can reach his destination more quickly. Sentiment cuts no figure with him. Just as the electric railway manager uses an automobile in reaching various points on his company's system because he saves time thereby, so his patrons will desert him if they can find service more attractive than his own. Comparatively speaking, 30 m.p.h. for street vehicles to-day is as slow as the 10 m.p.h. of thirty years ago. Hence the best present attainable speed of the electric surface car frets the restless rider.

This paper has consistently advocated every plan of railway transportation which contained possibilities of speed. Large parts of whole issues have been given up to them. We have, however, no generally applicable formula for obtaining higher schedule speed. Skip stops, stagger stops, short stops, more power per unit of weight (provided safety is duly considered), better car operation, both by motorman and conductor, etc., are all good. The main thing is to speed up, remembering that the speed quality of service is judged by the speediest available competitive facilities.

Constitutional Barrier Is Bugaboo of Commission Imagination

THIS not a comedy of errors, for to the company the situation is tragic. The New York & North Shore Traction Company, financed under commission supervision and economically managed, is in financial need. Its franchises stipulate a 5-cent fare, but a high court, whose decision has not been reversed, lately held that this restriction could not estop commissions from granting just and reasonable rates to this company. Accordingly the Second District Commission in Albany unanimously increased the rates of the company for part of its line, but the First District Commission in New York City, in whose jurisdiction the rest of the company's system lies, now unanimously refuses to grant the relief which it admits is needed. The court, it intimates, didn't know the law.

Wherein do the two commissions differ? The Albany body, as it ruled in detail last November in the Huntington Railroad case, believes that franchises cannot be allowed to interfere with the exercise of the sovereign police power of the State, which covers rate-making. The Metropolitan Commission asserts that local authorities have a constitutional right to insert unalterable maximum fare clauses in franchises as a condition to their consent to operation. The two decisions are diametrically opposed, and nothing less than a proper interpretation of the Constitution is the issue.

The New York State Constitution undeniably requires the consent of local authorities to electric railway operation. But does that mean that a municipality can impose any condition it thinks proper? There should be no pussy-footing about this point. Either the local authorities are absolute sovereigns in granting consents, or they are subject to certain restrictions. If, as Commissioner Whitney alleges, a municipality is a completely independent power in dealing with the authorization of new utilities, rates are not the only point subject to sovereign whims. What of service, of facilities, of a prohibition of any control whatsoever by a State regulatory body—in other words, of unrestricted home rule? Manifestly the Constitution never contemplated this. Mr. Whitney's argument, completed, is a fine example of *reductio ad absurdum*.

The unescapable fact is this—that local authorities are not absolutely free in granting consents to utilities. The Constitution does not even by implication prescribe the terms of consent. The best proof of this is the fact that, before the regulatory system was put in operation, proper terms of consent were outlined in statutory law, such as the Railroad Law and city charters. Now the provisions of such laws in regard to rates have been superseded by the Public Service Commission Law, and this should be followed. In other words, the constitutional "consent" clause, not explicitly drawn in early years of regulation, has from time to time been interpreted by statutory law in accord with modern thought and experience. What the New York City Commission asks for is an obsolete interpretation.

But is this commission quite clear itself as to rate-making fundamentals? If Commissioner Whitney believes that the State has no paramount rate-making power when municipalities care to fix maximum fares in consents, his statement about the rate of fare is ridiculous: "Neither [the Legislature or the city]

could advance it above a maximum fixed by the other." Thus, if the Legislature should revert to rate-fixing and prescribe a 5-cent maximum, no fair-minded city authorities could consent to a new utility beginning operation at a higher rate. Can a municipality's will in rate-making then be considered supreme? No, its consent must be given with recognition of the rate-making power of the Legislature under the police powers authorized by the Constitution.

This is the view taken by the Albany Commission, and it is the sane one. The New York City Commission has simply gathered a mass of technical and legal subtleties—most of them originating in days of undeveloped regulation—and by means of hard constructions and strained inferences accomplished what has been called the "torture of laws." The Constitution protects the State rate-making power, just as it does municipal consent. The Metropolitan Commission would read into the latter provisions which would destroy the first. Why this favoritism?

New York City Commission Gives Companies Little Chance

THE constitutional obstacle which the New York City Commission finds will prevent the grant of a reasonable fare to the North Shore Company seems a false creation of the imagination. But suppose that the commission, unlike its broader-minded and more constructive companion commission in Albany, is afraid to proceed without reassurance from the court of last resort. This is no reason why the company should be penalized and even allowed to go to ruin in the meantime. The only fair procedure would have been to grant relief with provision for restitution if later required.

But the means of relief suggested in the decision are more to be criticised. Here is the situation. Instead of granting the needed revenues the commission suggests three possible remedies. First, the company might ask the city for a release from the franchise fare limit. This is a touch of sardonic humor, in view of the fight made by the city against the company at the hearings. Second, the company might ask the city for release from certain franchise payments. These obligations, let it be explained, are a part of the municipal consent which the commission deems supreme under the protection of constitutional law.

Or, third—and here is the climax of the scheme—the city might municipalize the property. Commissioner Whitney scrupulously avoids saying that municipal ownership should be sought, but to anyone reading between the lines the decision seems to urge the company toward this. The company is left between the devil and the deep sea—between litigation under financial difficulties and municipal ownership under some plan which is inferentially to be considered easy of accomplishment. It should be noted that heretofore in public utterances, one of which was published in the issue of Dec. 1, Commissioner Whitney has taken pains to explain with what comparative facility the rapid transit act could be extended to authorize the purchase or lease of the surface lines.

Without doubt there will be certain surface railway problems to be solved in New York City when the new

rapid transit system is completed. It is most unseemly, however, for any commissioner to talk so much about public ownership of companies while fare cases for such carriers are pending. Commissions are appointed not to spread political propaganda, but, with other duties, to adjudicate rate cases impartially. While theoretically a commissioner can talk municipal ownership and still protect the fair return of the existing private investment, practically such talking is as flagrantly wrong as the holding of securities in regulated utilities.

Electric Railways Offer Attractive Occupation for Women

THE New York Railways Company deserves the thanks of the industry for demonstrating the practicability of the use of women conductors on surface cars. Whether the experiment would have been undertaken had it not been for the existing labor shortage on account of the war, it is hard to say. At any rate, it is a proved success. Some 300 women are now being employed as conductors on the Broadway, Seventh Avenue and Eighth Avenue Lines, as well as on four of the crosstown lines (including one storage-battery line), and others will be employed when the accommodations for them at the different terminals are installed. We believe this was the first instance of the kind, at least on any considerable scale, in this country although to the Brooklyn Rapid Transit Company belongs the credit of using women first in transportation service, namely as guards on its Fourth Avenue subway line.

One reason which has possibly held back other companies from this course has been a fear of disapproval on the part of present men employees. The New York Railways Company, however, disarmed all possible criticism from such source by explaining, first, the necessity of the plan from a labor standpoint, and, second, by assuring the present men that none of them would be supplanted. Women would be engaged only to fill vacancies, and any man could retain his position on his line and on its seniority list if he cared to do so, or if he wished to train as a motorman the company would give him the instruction and let him keep the rate of pay which he had earned by seniority as a conductor.

The women receive the same rate of pay as the men, choose their runs according to their position on the seniority lists in the same way as the men, and work on cars in which fares are collected after the passenger becomes seated as well as on prepayment cars, so that no distinction is made in their class of work. Car posters, however, explain to the public that the women are doing a patriotic duty and passengers are requested to help them by having their fares and transfers ready. Although the period since the women have been at work has been about as unfavorable so far as weather is concerned as could be imagined, there has been no complaint from the new employees or from the public.

The result of the New York experiment is that a new and responsible occupation has been opened for women at good rates of pay, under working conditions far less arduous than those under which many women work. We see no reason why women conductors should not be employed on many other roads in this country to the benefit of the women and in the interests of good service.

The Front-Entrance, Center-Exit Car and Higher Schedule Speed

For Conductors' Stations on Recent Pay-As-You-Pass-Cars See Diagrams on Page 122



Experience in Several Cities Is Cited to Show That This Type of Car Is Meeting Expectations —Minor Details Are Undergoing Improvement

FOUR years ago the Cleveland Railway introduced a type of car in which the conductor was stationed near a center exit, the entrance being at the front. The fares were paid as the passengers passed the conductor, the fare-collection period being thus extended as compared with that in the pay-as-you-enter car. The story of the inception of the new type of car was fully covered in an article by its inventor printed in the issue of this paper for Jan. 5, 1918. Since its inception in Cleveland it has been introduced in Schenectady, Syracuse, Rochester, Buffalo, Toledo, and on the lines of the Mahoning & Shenango Railway and the Buffalo & Lake Erie Traction Company.

The purpose of the present article is to give the results of a study of the operation of the front-entrance, center-exit car on the properties mentioned. For this purpose a number of cities were visited by members of the staff of the JOURNAL, managers and heads of the several departments concerned were interviewed, and the car operation was examined under rush-hour as well as average conditions. As any good car is bound to be satisfactory to patrons when there is plenty of unoccupied seating capacity within, attention was particularly concentrated on the rush hour.

In order to focus attention on the essentials, such questions as the following were kept in mind, and were addressed to the officials consulted:

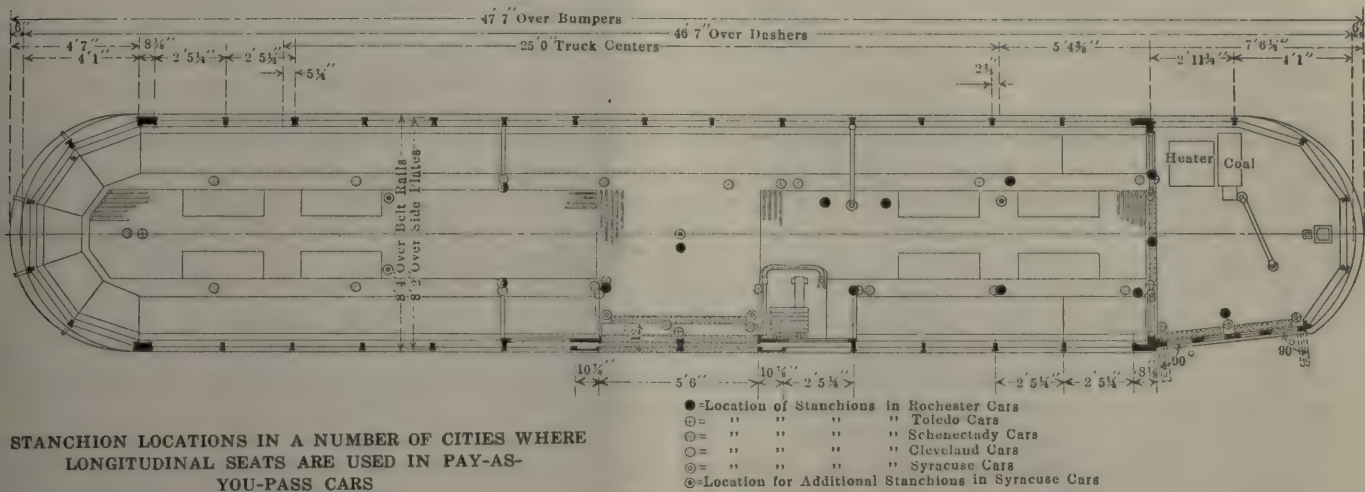
1. What have proved to be the most conspicuous virtues of these cars?
2. Are any data available as to the relative loading and unloading speeds of these cars as compared with cars of other types?
3. What changes have suggested themselves as a result of the use of these cars?
4. Is there noticeable crowding at the entrance end of the cars?
5. Has there been any noticeable loss in fares due to the working off of old transfers on the conductors at heavy unloading points during the rush hours?
6. Has there been any tendency to "beat it" at the front entrance door when the motorman is away from his post for the purpose of changing switches, etc.?
7. Is there much confusion due to the use of the front entrance on account of the patrons being accustomed to entering at other points in the cars?

Other questions will suggest themselves to the reader, and it is hoped that any such will be answered at least indirectly in the reports of observations which follow.

It is the unanimous testimony in all cities that the new cars are conspicuous for the facility with which passengers can board and alight. Obviously with two lines entering and leaving, and no throttling of ingress due to fare collection and transfer issuing, there ought

to be a considerable saving in time over earlier cars. Curves showing this feature were reproduced on page 31 of the Jan. 5 issue. One superintendent said that he had received much favorable comment from car users, especially from aged people who liked to ride

wise seats the latter were preferred by some because their use resulted in a greater floor space for standing passengers. As the car is particularly adapted for rush-hour service this argument is a strong one. Opposed to it, however, is the psychological fact that



upon these cars on account of the ease with which they could get on and off.

In Cleveland one of the officials of the railway estimated that loading and unloading with these cars are at least 50 per cent faster than with the company's center-entrance cars. As the cars in the city are used mostly on crosstown lines where the passengers are in general picked up in groups, this loading feature is especially important. In Schenectady when the cars were first put into operation it was estimated that

passengers prefer to sit in cross-seats, because it is easier to brace oneself against the inertia force when the car stops and starts, and there is a certain sense of privacy due to the stall arrangement thus provided. At any rate, it is easier to persuade the riders to go to the rear of the car, paying their fares en route, when they see cross-seats there.

After experience with the longitudinal seats several companies will use cross-seats in later cars, although it is only fair to say that opinion as to the wisdom of



A HEAVY LOADING AND UNLOADING POINT IN BUFFALO, N. Y. WITH THIS TYPE OF CAR THE BOARDING AND ALIGHTING PASSENGERS ARE SEGREGATED

from three to five minutes would be saved on a half hour of running time.

When these pay-as-you-pass cars were first designed, and for some time afterward, there was a tendency to use longitudinal seats in the rear as well as the front, where they are of course necessary. As the seating capacity is substantially the same with cross and length-

doing so is not unanimous. In the opinion of at least one manager the public is not adverse to the earlier arrangement after a few days' experience, especially those passengers who are obliged to ride in the rush hour. On the other hand, considered as a seating proposition rather than a standing one, there is no doubt that the cross-seats conduce to a better use of the seat-

ing space. The whole question resolves itself eventually into one of the extent to which the rush hour is to settle the seating arrangement; and, keeping the passengers' comfort in mind, there is no doubt that those fortunate enough to secure seats at all in the rush hour are much more comfortable in cross-seats.

Quite directly connected with the pay-as-you-pass principle is the matter of floor levels and ramps. Here there are two sets of conflicting requirements between which a compromise is necessary. In the first place, it is desirable to get the passengers to their seats and to the street with as little climbing as possible. A low-floor car is therefore practically a necessity, and a single exit step is desirable. But ramps to permit one exit step may cause accident, although properly placed stanchions will minimize this danger. At times other than loading and unloading, a ramp is uncomfortable for those who have to stand upon it, and it should be as easy as possible for passengers to pass from the front of the car to the rear. Therefore, the tendency seems to be to do away with the ramps as will be done in the new Syracuse, Toledo and other cars.

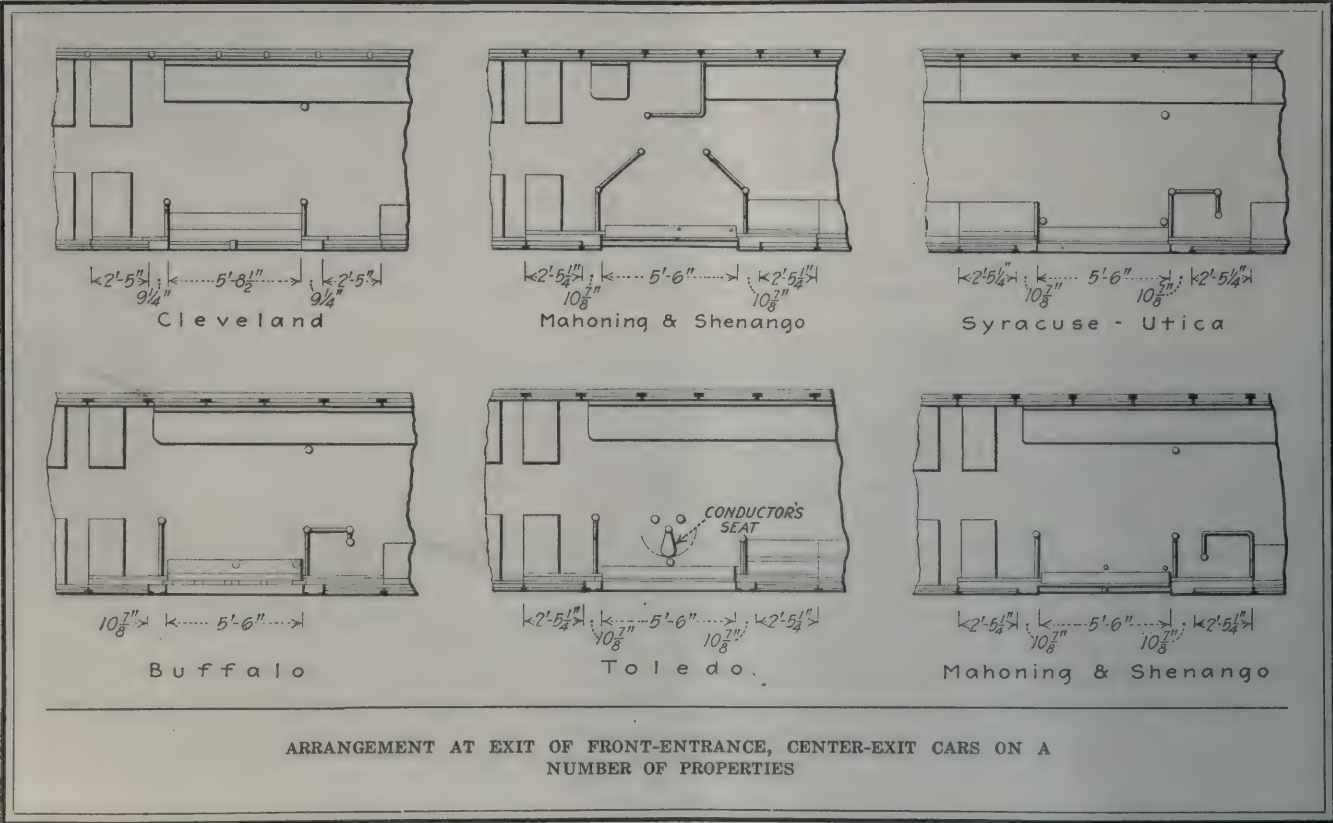
The early Syracuse car has 5½ in. in the ramps, and one exit step. The new cars will have these step

the number of arguments between passengers and conductors as to whether fares have been paid or not.

Some support must be provided for passengers standing and in transit. Horizontal hand poles and vertical stanchions have been used for the purpose, preferences regarding them being divided. In Rochester several stanchions have been added to the original equipment, the horizontal rods being removed. The latter are, however, in general retained, extending the length of the car when longitudinal seats are provided in the rear. In the new Syracuse cars the rod will extend from the front of the dividing stanchion only, as it is considered not desirable to encourage standing in the center of the car. The rod in this case will be placed 66½ in. above floor slats, and 13½ in. out from the frieze board.

There is considerable objection to stanchions in that they mar the appearance of the car and interfere with cleaning. On the other hand they are comfortable for the passengers and are adapted to the use of children and short adults.

In seeking the best locations for stanchions in longitudinal seat cars the New York State Railways, Syracuse lines, secured from several other roads informa-

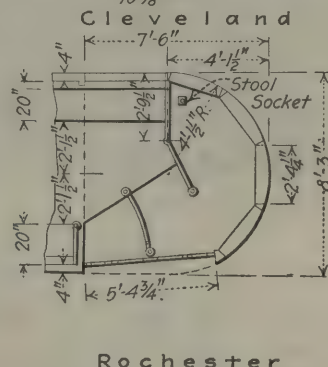


heights: Front entrance, rail to step 13⅞ in., step to platform 12 in., platform to floor 5½ in.; center exit, rail to step 13⅞ in.; each step 8 7/16 in.; slight drainage ramp in floor at middle of car. In Syracuse it was found that most accidents occurred near the middle of the front ramp, there being very few on the back ramp. This checks with experience in Rochester, where it was noted that the accidents occurred through the starting of the cars. In Syracuse the moving of the middle stanchion to a position half way up the front ramp has had a beneficial effect in reducing accidents. Another benefit of this has been to cut down

tion as to their practice. A diagram like that shown was prepared to indicate the several stanchion layouts superimposed. Dummy stanchions were also placed in a car and representatives of several departments were asked independently to place them where they thought best. The averages of these locations were then selected as far as was practicable from the structural standpoint. Some deviation was necessary in cases, such, for example, as when the ideal location proved to be over a trapdoor in the floor. The final selections are indicated on the diagram on page 121.

One of the big problems in rush-hour transportation

The fact is that the public is not to any considerable



TYPICAL FRONT PLATFORM LAYOUTS, SHOWING MOTORMEN'S STATIONS,
STANCHIONS, PARTITIONS, ETC.

An element in quick loading is to eliminate possible confusion due to misunderstanding as to car boarding points. As the public is accustomed to rear and center-entrance cars there was a question as to

the effect of adding to existing rolling stock new cars with front entrances. Of course, if all cars on a system were alike there would be no confusion, but what if there are other types on the system or were on the

The above does not mean that the pay-as-you-pass car is not adopted to the zone system, but is simply cited to indicate that even in the birthplace of this type there are routes on which it has not yet been con-



FLASHLIGHT SCENE DURING EVENING RUSH HOUR
AT ROCHESTER, N. Y.

same line? This point was therefore carefully investigated.

The result of the investigation was to show that the public soon "takes to" the front entrance cars, readily learning to distinguish them and locating themselves properly. Entrance signs such as were mentioned by J. F. Layng in his article in the Jan. 5 issue will prevent confusion altogether. In Schenectady the few complaints received by the company that were chargeable to the entrance location were, in the opinion of the local officials, due rather to the other cars than to the front-entrance cars. In Cleveland there was less confusion with the latter than with the older front-and-rear platform car which operated rear entrance on the inbound trip and front entrance in the outbound trip.

In most of the cities where the front-entrance, center-exit car has been introduced the operating conditions have been rather similar, the collection of a single fare being involved. In Cleveland it has been considered impracticable to operate it on the Lakewood line, for example, where the following conditions obtain. The 3-cent fare is collected pay-as-you-leave up to the zone limit and 5 cents is collected from everyone leaving the car beyond that point. Any one boarding the car beyond the limit must pay as he enters and is given an identification slip for use when he gets off. Coming into the city all fares are collected pay-as-you-enter and an identification check is given to all passengers who have paid 5 cents. Then when the zone limit is reached the conductor goes through the car and collects these checks.

sidered applicable. As stated on page 33 of the issue for Jan. 5, the zone plan will be operated on the five-zone line of the Mahoning & Shenango Railway between Warren and Lowellville, Ohio, for which the pay-as-you-pass cars have been adopted.

Advertising on Top of Cars



BARTLESVILLE, OKLA., INTERURBAN CAR WITH ADVERTISING
SIGNS ON TOP

THE cars of the Bartlesville (Okla.) Interurban Railway carry advertising cards on the top outside as well as on the inside. The placing of the exterior cards is shown in the accompanying illustration. The four cards on the outside bring in as much revenue as the thirty or more of those on the inside.

Constitutional Barrier Against Fair Rates

Seven-cent Fare for New York City Line Would Be Reasonable, but First District Commission Refuses Relief—Alleges City Has Constitutional Right to Fix Fare Limit in Consenting to Operation—Municipalization Mentioned as One Way Out

SO near and yet so far! The New York & North Shore Traction Company ought to have a 7-cent fare, in view of its financial circumstances and its right to earn a fair return. The Public Service Commission for the First District of New York, however, believes that it has no power to authorize the increase. In its opinion, only proof of the waiver or modification by New York City of the 5-cent fare limitation which the municipality made a condition of its constitutional consent to the use of the streets could enable an increase to be made through the commission's exercise of power delegated to it by the Legislature. Among the other methods of relief which the commission mentions is municipalization.

To appreciate this decision, which was unanimously approved on Jan. 10, it is necessary to recall that the New York & North Shore Traction Company lies partly within the jurisdiction of the First District or Metropolitan Commission in New York City, and partly in that of the Second District or Up-State Commission. Some time ago the company was refused an increase in fare by the latter commission, on the ground that the local authorities had prescribed a 5-cent fare as one of the conditions of consent to operation. The New York Appellate Division, Third Department, however, ruled that the commission had the power to grant an increase, rate making being essentially a legislative function. In accordance with this decision the Up-State Commission recently increased the rates of the company on the lines within its jurisdiction.

Application was then made for relief for the lines in New York City. Acting under the same fundamental law, the Metropolitan Commission has now reached an opinion diametrically opposed to that of the Up-State Commission, as expressed in the New York & North Shore case and with greatest detail in the recent Huntington Railroad case (ELECTRIC RAILWAY JOURNAL, Nov. 24, 1917). The opinion of the Appellate Division, Third Department, the New York City Commission dismisses with deference, but in words practically amounting to an assertion that the court did not know what it was talking about.

FUNDAMENTAL QUESTION IS ONE OF CONSTITUTIONAL LAW

The point of vital importance, therefore, is this: What does the Metropolitan Commission think it has found to be an insuperable obstacle against what its companion commission believes is a proper exercise of regulatory powers? The decision of the New York City body, eighty-nine printed pages in length, is too voluminous for reproduction here. The following abstract, therefore, will omit entirely the discussion of the financial needs of the company, since the commission finds that a just and reasonable maximum fare would be 7 cents, and will confine itself to the main conclusions

reached by the writing commissioner, Travis H. Whitney. The financial needs of the company, it might be added, were explained in these pages at various times last summer in the reports of the hearings that were held in the case.

The legal provisions underlying the case are briefly shown at the bottom of page 126. The vital question, involving basic points as to the demarkation between State and municipal powers, relates to the difference between *constitutional* and *statutory* law. The New York State Constitution (Article III, Section 18) provides that "no law shall authorize the construction or operation of a street railroad except upon the condition that the consent . . . also of the local authorities . . . be first obtained."

Confusion has arisen, Mr. Whitney says, from a failure to keep in mind the contrast between such a constitutional requirement and a mere statutory authorization of such local consent. The issue, he states, has not been passed upon by controlling authority in the State, and co-operation in securing an early adjudication of the question is desired.

RATES ALTERABLE WHERE ONLY STATUTORY LAWS ARE INVOLVED

In presenting what he believes to be the relevant legal principles involved, Mr. Whitney avers that cases which have arisen in the absence of such a constitutional provision as above noted are not applicable. A distinction as to the Legislature's subsequent powers is clearly to be drawn between a case where the city fixes a fare maximum in the exercise of legislative powers delegated to it by the Legislature and a case where the city fixes the fare in the exercise of powers granted to it by the Constitution in limitation on the powers of the Legislature. Where the Legislature delegates its general powers to the city as its agent, the Legislature may lessen or abrogate those powers, or may abrogate or modify, directly or through another agent (the commission), what has been done by and through the first agent (the city).

No more than this, Mr. Whitney states, is held by such cases as *City of Worcester vs. Worcester Street Ry.*, 196 U. S. 539; *Arlington Board of Survey vs. Bay State St. Ry.*, 224 Mass. 463; *New Orleans vs. New Orleans Water Works*, 142 U. S. 79; *North Wildwood vs. New Jersey Public Utilities Commissioners*, 95 Atlantic 749; *Matter of City Water Company*, P. U. R. 1917 B, 624; *Puget Sound L. & T. Co. vs. Reynolds*, 37 Supreme Court Reporter 705; *Bay State St. Ry. Rate Case*, P. U. R. 1916 F, 221; *Denver R. R. vs. Englewood*, P. U. R. 1916 E, 134, and similar cases.

To bring the point closer home, Mr. Whitney admits that, according to the trend of judicial pronouncement which the commission ought in fairness to follow, there is no *statutory* barrier to the granting of a 7-cent fare

for the New York & North Shore Traction Company. Along this line he says:

"It cannot be gainsaid that the disposition of the New York courts has been to uphold the view that the Legislature has made the commission a repository of the legislative power, the Legislature's agent for the expert ascertainment and enforcement of reasonable rate standards, empowered thus to supersede for good cause shown a rate once fixed by the Legislature itself. The tendency has been to look upon the language of the various statutes as warrant for the paramountcy of the commission's expert findings over lower or higher rates fixed casually by the Legislature; except, of course, where the Legislature otherwise specifically directs as to the commission's power over rates, as in the case of gas and electrical corporations.

"At least in the absence of a further clarification of the subject through judicial decision, I am constrained to hold that, aside from the limitation contained in the franchise granted by the city under the constitutional provision, there is no barrier to the commission's power to sanction the placing in effect of a 7-cent rate. I believe that the present case may best be determined on that basis, without prejudice to a fuller consideration of this phase in connection with other cases now being heard. It should be said, of course, that in passing upon the issues of the present case, the commission has in nowise dealt with the question of its power to sanction an added charge of 2 cents for transfers, over and above a 5-cent fare, on the part of companies whose franchises from the city contain no conditions as to fares or transfers."

In Mr. Whitney's opinion, however, an essentially different situation arises where, as in New York, the Legislature's power with respect to the use of the streets is restricted by a constitutional requirement, and "the legislative power possessed by the municipality to grant, withhold or fix terms for its consent to such use is derived not from the Legislature but from the Constitution." Under the constitutional provision the city is empowered to exercise the legislative power of determining the conditions on which it will grant its consent, if at all. (*Adamson vs. Nassau Electric R. R.*, 89 Hun 261, 266; *People ex rel. Frontier Ry. vs. City of North Tonawanda*, 70 Misc. 91; *Detroit Citizens' St. Ry. vs. Detroit Ry.*, 171 U. S. 48; *People ex rel. South Shore Traction Co. vs. Willcox*, 133 App. Div. 561; *Allegheny City vs. Railway Co.*, 159 Pa. 411, 416).

DECISION OF APPELLATE DIVISION WRONG

The decision of the Appellate Division, Third Department (175 App. Div. 869), in the New York & North Shore case is asserted by Mr. Whitney to proceed on assumptions unsupported by the authorities. He says:

"Its basic assumption is stated to be, not that Section 18 of Article III of the Constitution is to be read as a limitation and a restriction on the general legislative power conferred on the Legislature by Section 1, or that Section 18 delegates certain sovereign power to the city, just as Section 1 delegates certain powers to the Legislature, but that 'manifestly Sections 1 and 18 of Article III of the Constitution must be read together.' This statement evidently led a majority of the learned court to regard Section 1 as a limitation upon

Legal Provisions Underlying New York & North Shore Case

1. New York State Constitution:

Article III, Section 1: "The legislative power of this State shall be vested in the Senate and Assembly."

Article III, Section 18: "No law shall authorize the construction or operation of a street railroad except upon the condition that the consent . . . also of the local authorities . . . be first obtained."

2. Greater New York Charter:

Section 73: "Every grant shall make adequate provision by way of forfeiture of the grant, or otherwise, to secure efficiency of public service at reasonable rates and the maintenance of the property in good condition throughout the full term of the grant."

Section 74 (at the time petitioner obtained its franchise): "Before any grant . . . shall be made by the Board of Estimate and Apportionment, the proposed specific grant embodied in the form of a contract with all the terms and conditions, including the provisions as to rates, fares and charges . . . shall be entered in the minutes."

3. Railroad Law:

Section 93 (in 1909): "The local authorities may, in their discretion, make their consent to depend upon any further conditions . . . respecting the application of any provision herein con-

tained as to the carriage of passengers for a single fare . . . and also respecting any other matter concerning which, in their judgment, further conditions would be for the public interest."

Section 181 (formerly Section 101): "No corporation constructing and operating a railroad under the provisions of this article . . . shall charge any passenger more than 5 cents for one continuous ride from any point on its road, . . . within the limits of any incorporated city or village . . . The Legislature expressly reserves the right to regulate and reduce the rate of fare of any railroad constructed and operated wholly or in part under such chapter or under the provisions of this article; and the Public Service Commission shall possess the same power, to be exercised as prescribed in the Public Service Commission Law."

Of the above-quoted excerpt from the present Section 181, Commissioner Whitney says, the last clause was added by Chapter 481 of the Laws of 1910, enacting the revised and amended form of the Railroad Law as Chapter 49 of the Consolidated Laws. In other respects Section 181 parallels Section 101 of the statute as it stood at the time the City of New York entered into a franchise contract granting its "consent" to the petitioner.

4. Consent of City of New York:

In obtaining the "consent" of the City of New York to the construction and operation of its railroad, the petitioner entered into duly executed contracts under date of Feb. 1, 1909, and April 14, 1909, respectively. Among the conditions in these contracts were the following:

"The rate of fare for any passenger upon said railway shall not exceed 5 cents, and the company shall not charge any passenger more than 5 cents for one continuous ride . . . within the limits of the city.

"This grant is also upon the further and express condition that the provisions of the Railroad Law, pertinent hereto, shall be strictly complied with by the company."

5. Public Service Commission Law:

Section 49: "Whenever either commission shall be of opinion . . . that the maximum rates chargeable . . . are insufficient to yield reasonable compensation for the service rendered, and are unjust and unreasonable, the commission shall . . . determine the just and reasonable rates to be thereafter observed and in force as the maximum to be charged for the service to be performed, notwithstanding that a higher rate has been heretofore authorized by statute."

Section 18 of Article III, and as qualifying the power granted to the local authorities by Section 18 of Article III, instead of looking upon Section 18 as *pro tanto* a separate grant of autonomous power possessed by the State or as a limitation upon Section 1.

"This inexactness then brought a majority of the court to the fundamentally erroneous conclusion that the local authorities are prohibited from attaching conditions to the consent which assumed to regulate the rate of fare, for the reason that the right to regulate fares to be charged by public service corporations is essentially a legislative function. . . . As well might the Legislature disregard the constitutional rights of the local authorities and itself assume to give the constitutional consent as the local authorities assume the constitutional rights of the Senate and Assembly to legislate regarding the rates of fare. . . . The constitutional provision regarding legislating is a restriction upon the local authorities in the matter of attaching conditions fixing rates of fare.' From this the court concluded that at least where the Legislature had not delegated to the local board the power to exact a fare condition in granting its consent, the Legislature might, through the commission, advance a rate above the figure the local board and the company had agreed upon.

"How far the New York & North Shore decision would, even under its own basis of determination, apply to and control a situation where, as in the present case involving the City of New York, the power to prescribe fares in granting 'consent' had been conferred on the municipality by express terms of a legislative act, if not also by fair implication from the constitutional grant, I do not think it necessary to discuss here. The primary question is whether the learned court was correct in its assumption that the Constitution prohibits the local authorities from making a fare limitation one of the terms and conditions of the local consent. I think it was not."

LEGISLATURE CANNOT MODIFY CONSTITUTIONAL RATES

If, then, a company has assented to a fare limitation as a condition of the city's consent for operation, can it be relieved by legislative action over the city's objection? Mr. Whitney says not. His belief he expresses as follows:

"If a municipality has bound an electric railway corporation to charge no more than 5 cents, the Legislature, in the exercise of its general regulative powers, could itself, directly or through a commission, reduce the fare to 4 cents or 3 cents, or could exercise its regulatory powers in any manner which did not nullify, defeat or impair the standards of maximums in rates and minimums in service which the city had set up as conditions of its consent. On the other hand, a general legislative act prohibiting a fare in excess of 10 cents would not prevent the city from granting its consent on terms prohibiting a charge in excess of 5 cents. Either the Legislature by a general act or a delegation of power to a commission or the city by a franchise contract could reduce the fare below a maximum fixed by the other, but neither could advance it above a maximum fixed by the other."

Mr. Whitney concludes, therefore, that the commission has no power to put a 7-cent rate into effect in the present case, in the absence of proof of the consenting

action of the city authorities. In summing up, he says:

"To construe the Public Service Commission Law to vest this commission with power to increase above the franchise maximum rates fixed by contract between a municipality and a street railroad corporation in the exercise of the constitutional requirement of the city's consent, would be to construe the Public Service Commission Law to be to that extent unconstitutional. At least any attempted exercise of such a power would be nugatory, as an attempt under color of statute to defeat a right protected by the constitution. The interpretation that the Public Service Commission Law was not designed to authorize any such interference with a franchise maximum is at least equally open to the commission and the courts, and in fact nothing in the language of this law denotes an intent to confer power to override a franchise contract. The barrier as to rates 'heretofore fixed by statute' is taken down, but there is no reference to rates fixed by a franchise contract under the constitutional protection.

"No such franchise contract can be exercised or proceeded under by the company without the approval of the commission and its determination of the public convenience and necessity thereof. The commission can grant or withhold its approval; it can refuse to approve because the city insisted upon a term or condition which defeats the public convenience and necessity; but if it finds that public convenience and necessity would be served, it cannot modify the terms of the city's consent or refuse to grant approval merely because it does not like the terms exacted by the city.

"The view contended for by the petitioner leads to absurd conclusions and would make the law accomplish ridiculous results. For example, that the Legislature could not prevent the city from binding the company to a 5-cent rate before letting the company use its streets but could take out the 5-cent limitation and authorize a dollar fare the day afterwards; and, likewise, that the commission could not modify the 5-cent fare clause of the franchise and substitute a higher fare before approving it, but could approve it first and then modify it as soon as approved. If, by reason of the constitutional provision, the Legislature 'could not' authorize the commission to modify the fare clause before approving the franchise, I do not believe that the Legislature could authorize the commission to modify it afterwards. And if, as the Appellate Division, Third Department, has held, the Constitution prohibits the city from putting a fare provision in its franchise contract, could there be doubt of the commission's power to refuse to approve such a clause?

"Within the sphere of its own constitutional functions, under the grant to it of sovereign powers of legislation, the Legislature is left free to regulate the public service corporations chartered by the State under its authority, and if, by such regulation, requirements are imposed in addition to those stipulated by the municipality, it cannot be said that the Legislature has usurped functions or powers of the city, or vice versa.

"It should perhaps also be emphasized that we are not here dealing with the question of public policy whether the commission ought or ought not to be vested with the power to advance the rates of the petitioner without the acquiescence of the city. That question of public policy is, or was, a matter for the people to decide, not the commission."

Mr. Whitney feels, however, that the present situation is one where the public authorities share responsibility with investors for the construction of the railway. To his mind, if the 5-cent fare does not afford an adequate return, it does not of necessity follow that the situation must be dealt with by the municipality through its consent to a fare increase. The situation may be dealt with in any one of these ways:

1. The city of New York may consent to a waiver or modification of the fare provisions of the franchise contracts, and thus enable the putting into effect of the 7-cent rate, which is found necessary for the continuance of present service under present operating costs.

2. The city and State may to a large extent lessen the company's financial difficulties by remission and repayment of moneys now going into the public treasury out of the company's revenues, by virtue of franchise and statutory provisions.

3. The city may extend to the company the principle and policy of municipalization, already embodied in other aspects of the city's transportation policy—such extension of municipalization to come about through purchase, lease, or acquisition under a municipal guarantee of a fixed return upon unimpaired investment, with a gradual amortization, over a period of years, of this investment out of the earnings, supplemented as need be by contributions from the public treasury.

CITY MIGHT STOP DRAINS ON REVENUE

Under the company's franchise the investment in New York City is being amortized out of earnings, so that at the end of the fifty-year period the property will pass to the city without further payment. In regard to this and other burdens imposed upon revenues by the city, Mr. Whitney says:

"The city is itself responsible for an annual drain amounting to nearly 25 per cent of the company's corporate income. This sum is exacted in addition to all State and local taxes, including franchise taxes amounting to \$1,663 more, and this sum is subtracted from the company's corporate income by virtue of the provisions of the same instrument which stands in the way of advancing the fare above 5 cents.

"The bearings of such a policy should be frankly recognized. What goes into the public treasury as taxes, percentages, relinquished property, and the like, must, under circumstances such as those operative as to this company, come out of the fare-payer, or must in some other form come again from the taxpayer. It cannot, over any long period of time, come out of the investors. Efforts to leave the investors to bear the burden can only mean deterioration of service, failure to make needed extensions and eventual receivership. Ought the city to require passengers to pay the cost of early city ownership of all the company's property situated in city streets, and nevertheless leave the company unable to do more than furnish to those passengers grossly inferior service?

"If the city does not wish fares to be advanced so as to enable the company to keep up the present rate of payment of percentages, franchise taxes, amortization and the like, the city might help meet the situation by further modifying the franchise terms so as to obviate this drain on the company's revenues, and might fur-

ther ask for legislative action dispensing with franchise taxes now payable out of the company's too slender receipts."

In regard to meeting the situation by extending the policy of municipalization from rapid-transit to surface lines, Mr. Whitney states:

"The city must soon face the problems arising from the fact that other corporations engaged in essential services of transportation, particularly if not embraced in and protected by the dual contracts, will continue under the necessity of having such a revenue vouchsafed as will allow them also, in addition to all operating charges and allowances, a reasonable return upon the value of the property used by them for the public service. If this means a cost per passenger in excess of 5 cents, the public is faced with the alternative of requiring passengers in less congested regions to pay a fare in excess of 5 cents or of extending the municipalization of responsibility or ownership so that the cost of transportation, if in excess of that which can be met by a 5-cent fare ordained by public policy, shall to that extent be borne by the public through taxation.

"For it is obvious that if a needed service of transportation is to continue it must derive from some source sufficient revenue to meet all costs of transportation, and that this is true whether such transportation is furnished by private ownership and operation, or by municipal ownership and private operation, or by municipal ownership and municipal operation. If private ownership and operation continues, the public must realize that fares must be such as to produce a sufficient income. But, on the other hand, if the fare is to remain constant and uniform, there must be provision whereby increasing costs of transportation shall be met, if need be, through further extensions of municipalization."

How Municipal Lines Are Aiding Great Britain

THE Municipal Tramways Association of Great Britain has issued an elaborate series of tables in regard to allowances for dependents, war bonuses, enlistments, employment of women and similar matters. Below is published a comparative summary of the activities of the municipal electric carriers along such lines in 1916 and 1917 (data having been supplied in August):

	July, 1916	July, 1917
Number of municipal authorities replying to queries	88	84
Number of towns certified under Munitions of War (Amendment) Act	44	57
Number of employees at normal times	55,208	55,208
Number of men who have joined His Majesty's Forces	20,905	29,268
Percentage to total	38	53
*Number of men who have left municipal tramways undertakings to join munition factories	1,893	1,776
Percentage to total	3½	3.2
Amount paid to dependents of employees serving with His Majesty's Forces	£854,649	£1,437,603
Average allowance per man per week	10s. 7½d.	11s. 4½d.
Amount collected on cars for various national and other objects	£43,800	£84,509
Amount contributed by municipal tramway employees to various relief funds	£26,070	£38,170
Number of municipal systems employing women conductors	75	76
Number of women conductors	8,433	11,767
Number of municipal systems employing women drivers	7	18
Number of women drivers	176	611
Number of municipal systems employing auxiliary drivers	19	26
Number of auxiliary drivers (male)	820	564

*The figures under this heading are only approximate, as it is not known what particular section or unit the men have joined. Therefore in some cases these have been included in enlistments.

How New York Commissioners Differ in Basic Rate-Making Views

Second District

Commissioner Carr

It may be said to be settled that the Legislature has full power to delegate rate-making powers to the Public Service Commission, and that the Public Service Commission has full power to fix just and reasonable rates for carriers and public service corporations, and that the fixing of rates is a proper exercise of the police powers of the State.

* * *

In view of the numerous decisions from which we have quoted at length we think it is settled beyond question that municipalities have no right to impose conditions in franchises other than those which the statute gives them the power to exact. The fact that conditions restricting the fare within the municipality are imposed in a franchise does not deprive the Legislature of the supreme power to determine what conditions shall be imposed upon a street railroad corporation.

* * *

We are therefore of the opinion that notwithstanding the conditions in the several franchises granted to the Huntington Railroad, which attempted to fix a 5-cent fare within certain specified territory, the same was binding upon the company until such time as the Legislature should intervene for the purpose of regulating this fare, and that this commission has the power under the provisions of the law which created it to revise the fare fixed in the franchises.

Commissioner Van Santvoord

It is and always must be the Legislature which exercises final authority in regulating rates and fares; and authority delegated to a municipality to exercise this purely legislative function must be considered as forever subject to recall or modification by the final law-making power.

Commissioner Emmet

Our first duty is to the public. * * * In cases which involve the nullification of rate agreements that were supposed, when made, to be absolutely binding upon both parties, I think it must appear that substantial benefits will result to the public from the granting of the relief sought—or, rather, that substantial injury will be suffered by the public if relief is withheld, before we can act favorably on these applications against the protest of one of the parties to the bargain.

Commissioner Irvine

The result of such a bargain is merely a contract between the parties thereto, subject to be modified or annulled by the State in the exercise of its police power.

Commissioner Barhite

(Quoting an Illinois decision.) "The general rule is that a railroad company is a quasi-public corporation and under peculiar obligation to the public, and that consequently it cannot make any contract which will disable it from performing its public functions."

First District

Commissioner Whitney

It cannot be gainsaid that the disposition of the New York courts has been to uphold the view that the Legislature has made the commission a repository of the legislative power, the Legislature's agent for the expert ascertainment and enforcement of reasonable rate standards, empowered thus to supersede for good cause shown a rate once fixed by the Legislature itself. The tendency has been to look upon the language of the various statutes as warrant for the paramountcy of the commission's expert findings over lower or higher rates fixed casually by the Legislature.

* * *

Powers possessed by the Legislature may be delegated by it to a municipality, a commission or any other creature of the State. * * * This rule governs all situations as to which the Constitution has vested the legislative power exclusively in the Legislature.

* * *

An essentially different situation arises, however, where, as in New York, the legislative power with respect to the use of public streets by a street railroad is restricted by a constitutional requirement, and the legislative power possessed by the municipality to grant, withhold or fix terms for its consent to such use is derived not from the Legislature but from the Constitution.

* * *

When the Constitution provides (as in New York State) that no street railroad shall be constructed or operated along a public street without the consent of the local authorities of that city or village, the legislative power as to the granting or withholding of that "consent," as to the fixing of the terms thereof, is, *by the Constitution*, vested not in the Legislature but in the municipality, and the power of the Legislature is to that extent qualified and limited.

* * *

To construe the Public Service Commission Law to vest this commission with power to increase above the franchise maximum rates fixed by contract between a municipality and a street railroad corporation in the exercise of the constitutional requirement of the city's consent, would be to construe the Public Service Commission Law to be to that extent unconstitutional.

* * *

I reach the conclusion that the rule, better supported by reason and by authority, vests the commission with no power to sanction and put in effect a 7-cent rate on the lines of the petitioner in the absence of proof of the consenting action of the city authorities.

* * *

It should perhaps also be emphasized that we are not here dealing with the question of public policy whether the commission ought or ought not to be vested with the power to advance the rates of the petitioner without the acquiescence of the city. That question of public policy is, or was, a matter for the people to decide, not the commission."

Commission-Made Rates Are Paramount

Second District Commission in New York Has Laid Down Principle That It Has Full Power to Increase Rates in Spite of Maximum Set by Old Laws or Local Franchises

By THOMAS CONWAY, JR.

Professor of Finance, Wharton School of Finance and Commerce, University of Pennsylvania

THE decision of the Public Service Commission for the Second District of New York, in the Huntington Railroad case,* marks an epoch in the career of this commission. Indeed, there can be no doubt that it is one of the most important decisions which this body has ever rendered. Judged solely from the standpoint of the size of the petitioning company, this case is relatively unimportant. The Huntington Railroad is an electric line running across Long Island from Huntington Harbor, on Long Island Sound, to Amityville, on the South Shore, passing through Melville, Huntington, Farmingdale and a number of other towns in Huntington and Babylon counties. The entire capital stock of this road is owned by the Long Island Railroad. Its reproduction value, as shown by the evidence presented to the commission, is in the neighborhood of \$528,000. Commissioner Carr stated in his opinion: "During this period (1910 to 1916, inclusive) the company has earned \$338,840. Its operating expenses and taxes have amounted to \$22,798 more than the revenue, and so there is nothing available for interest on bonds, dividends on stock, or reservation for surplus and contingencies, to say nothing of a return upon the value of the property employed in the public service."

CASE SETS FORTH PRINCIPLES OF RATE-MAKING

The significance of the decision arises out of the fact that the case is, by the express terms of the opinion, to constitute a leading one, setting forth the general principles which the commission will follow in dealing with other petitions for increased fares.

Each of the five members of the commission prepared an opinion. The text of these opinions constitute eighty-two printed pages. The opinion which, as stated by the chairman, constitutes the opinion of the commission in the case, was prepared by Commissioner Carr and covers fifty-nine pages. Each of his four associates concurred in the findings set forth, although every member felt constrained, because of the importance of the issue, to express his individual views. The decision of the commission is unanimous, although, as is frequently the case with epochal decisions, the reasoning by which the several members of the body reached their conclusions shows considerable dissimilarity.

The purpose of this article is to endeavor to reflect the views of the several members of the commission upon the general questions presented and the principles laid down by them. In order to facilitate the discussion of the opinion, each phase will be taken up separately, although this plan is not followed in the opinions themselves.

Before the case of the Huntington Railroad could be judged upon its merits, the commission had to decide two legal questions, both of which concerned its power to permit an electric railway to charge a rate of fare in excess of 5 cents. The first question related to the effect of Section 181 of the Railroad Law, which prescribes the rate of fare to be charged within the limit of any city or village. This section provides that no electric railway "shall charge any passenger more than 5 cents for one continuous ride from any point on its road. . . . to any other point thereof, or any connecting branch thereof, within the limits of any incorporated city or village." The section further provides that "the Legislature expressly reserves the right to regulate and reduce the rate of fare of any railroad constructed or operated wholly or in part under such chapter [meaning the act of May 6, 1884] or under the provision of this article; and the Public Service Commission shall possess the same power, to be exercised as prescribed in the Public Service Commission Law."

REVIEW OF OLD LEGISLATION

The act of 1884 referred to above was the first general act passed by the Legislature of New York relative to electric railways. Prior to that time the practice had been to incorporate companies by special acts of the Legislature. Commissioner Carr's opinion reviews in great detail the provisions of these acts. He points out that the Legislature had not hesitated in this special legislation to amend the acts constituting the charters of the several corporations, with reference to not only matters concerning operation, but also the provisions relating to fares. Mr. Carr finds that prior to 1884 no specific provision had been made in the general railroad law to cover the rate of fare within a municipality, except as it might be claimed that it was covered by Subdivision 9 of Section 28 of the laws of 1850, wherein it was stated that the fare for passengers should not exceed 3 cents per mile. Section 33 of that same act also provided that the Legislature might, from time to time, after a railroad completed thereunder was opened for use, alter or reduce the rate of freight, fare or other profits upon such road, but that the same should not be reduced without the consent of the company, so as to make such profits less than 10 per cent upon the capital actually expended.

The act of 1884 set forth the method for incorporating an electric railway and what was necessary to be done in order to entitle it to construct, maintain and operate its road. Section 4 required the company to secure the consent of the local authorities—which requirement carried out the provision of the State Constitution. "The consent of the local authorities shall in all cases be applied for in writing, and when granted

*Preliminary abstract of legal points appeared in the *ELECTRIC RAILWAY JOURNAL* of Nov. 24, 1917.

shall be upon the express condition that the provisions of this act pertinent thereto, shall be complied with and shall be filed in the office of the county clerk of the county in which said railroad is located." The act further provided that franchises should be sold at public auction; that local authorities had a right to require as a condition of their consent that the electric railways should pay a certain percentage of its gross receipts, not exceeding 3 per cent, into the treasury of the city or village. The municipality could require the company to pave between and outside of its tracks.

Section 13 of the act provided in substance that an electric railway should not charge more than 5 cents for one continuous ride within the limits of any incorporated city or village. It provided, however, that "this section shall not be construed to apply to any part of any road heretofore constructed and now in operation, unless such company shall acquire the right to extend such road or to construct branches thereof under the provisions of this act, in which event its rate of fare shall not exceed its authorized rates prior to such extension." There was no provision in Section 13 of the act of 1884 to the effect that the Legislature reserved the right to alter or reduce the rate of fare therein provided, although there was a general reservation of the right to alter, amend or repeal the act. In 1886 the Legislature, however, amended the law, adding to Section 13 of the act of 1884 the following clause: "The Legislature expressly reserves the right to regulate and reduce the rate of fare on said railroad or railway." The act of 1884 as amended was repealed with the enactment of another general railroad act known as Chapter 565 of the laws of 1890. Section 101 of this act related to the matter of rates of fare and was substantially the same as Section 13 of the act of 1884 as amended by the acts of 1886, except that the provision restricting the 5-cent fare to the area within the limits of any incorporated city or village had been omitted. This omission was short-lived, for in 1892 the Legislature enacted Chapter 676 amending the Railroad Law and adding to Section 101 thereof the proviso that no more than a 5-cent fare shall be charged within the limits of any incorporated city or village.

CHANGES ARISING UNDER PUBLIC SERVICE COMMISSION LAW

With the passage of the Public Service Commission Law it became necessary to again amend the Railroad Law. The revision constituted Chapter 181 of the laws of 1910, or Chapter 49 of the Consolidated Laws. In so far as rates of fare of electric railways were concerned, Section 181 of the new act heretofore amended was substantially the same as Section 101 of the act of 1892, except that there had been added the provision that the right of the Legislature expressly reserved to regulate and reduce the rate of fare was possessed by the Public Service Commission, to be exercised by it as prescribed in the Public Service Commission Law. Commissioner Carr observes: "So we see that Section 181 of the Railroad Law as it exists to-day is substantially the same as the act which was passed in 1884, as far as the requirement relative to a 5-cent fare within an incorporated city or village is concerned."

The legislative injunction that the commission in exercising its power "to regulate and reduce fares" must do so in accordance with the provisions of the Public

Service Commission Law, led the commission to examine the provision of that law which would govern in the present proceeding. The opinion calls attention to Sections 33, 49 and 50. These sections permit the commission to prescribe just and reasonable maximum rates for all forms of reduced rates of passenger tickets of steam railroads and electric railways, authorize the commission to investigate the regulations, practices, equipment and appliances of an electric railway and to determine and enforce reasonable, safe and adequate standards of service and equipment, and authorize the commission to order changes and improvements in road and equipment, and additions thereto, if in its judgment the same are necessary to promote the security or convenience of the public or employees, or in order to secure adequate service or facilities for the transportation of persons or property. Section 49 provides that whenever the commission shall be of the opinion that the maximum rates, fares or charges chargeable by any such railroad or electric railway corporation are insufficient to yield reasonable compensation for the service rendered and are unjust and unreasonable, the commission shall determine the just and reasonable rates, fares and charges to be thereafter observed and in force as the maximum to be charged for the service to be performed notwithstanding that a higher rate, fare or charge has been heretofore authorized by statute.

COMMISSION HAS FULL RATE-MAKING POWER

After stating the provisions of the law, Mr. Carr says:

"What was the purpose of these sections giving such drastic powers to the commission and authorizing it to place heavy burdens on the electric railways, unless the commission was at the same time authorized to give such relief in the way of increased fares as might be necessary to enable the corporation to receive a fair return on the increased investment made necessary by the orders of the commission? It cannot be successfully urged that the commission has the right to order such improvements in service and equipment as might be necessary for the safety of the traveling public, even though this action on its part might in effect operate to confiscate the property of the corporation, for this is contrary to the law of the land. What then does the law contemplate in this respect? The answer is, that the commission is empowered to require the corporation to give proper service; and, on the other hand, to require the public to pay reasonable rates for such service. The law as it exists at the present time requires the commission to determine the just and reasonable rates which will enable electric railways to earn a reasonable return upon the value of the property actually employed in the public service and to provide a reserve for surplus and contingencies."

Mr. Carr's opinion reviews in detail the decisions of the courts of the United States and of the State of New York relating to the power of the Legislature to regulate and fix fares and of its creature, the Public Service Commission, to exercise similar powers, by virtue of a delegation of legislative power by the Public Service Commission Law. The apparent conflicts of judicial interpretation of the statutes are carefully analyzed, and the conclusion reached is this:

"We are not left in doubt as to the power of the

commission to deal with the question of the fare on electric railways, that having been made clear in the statute itself, but we do think the reasoning in the Ulster & Delaware Company case applies with equal force here, *viz.*: that the statutory rate fixed by the Legislature is the one binding upon the railroad company until such time as it is changed either by the Legislature or the commission, and that therefore the commission can increase this rate if it determines that a fare of 5 cents is unjust or unreasonable to the corporation."

FRANCHISE RESTRICTION NOT CONTROLLING

The second major question which confronted the commission concerned the provisions of the franchise defining the rates of fare to be charged by the carrier. It will be remembered that the several acts of the Legislature, hereinbefore mentioned, provided that an electric railway must secure the consent of the several municipalities to the construction of its lines and that "the consent of the local authorities shall in all cases be applied for in writing, and when granted shall be upon the express condition that the provision of this act pertinent thereto shall be complied with, and shall be filed in the office of the county clerk of the county in which said railroad is located."

The Huntington Railroad had been forced to enter into stringent bargains with the various villages through which it operated. Provisions were inserted in the franchises granted by the town of Huntington, by the County of Nassau, by the village of Farmingdale, by the town of Babylon and by the village of Amityville, restricting the rate of fare to 5 cents per zone and defining in great detail the precise limits of each zone. In several cases the company was required to furnish a bond in a substantial amount. These agreements provided that they were to extend to the company and its successors, and in several cases that a violation should work a forfeiture of the franchise. As Mr. Carr observed at the time the case was tried, it would be almost impossible to find a company with more stringent franchise provisions concerning the rate of fare which it could charge.

The communities through which the Huntington Railroad operated, in inserting stipulations concerning the rate of fare, were following a practice which was quite general throughout the State of New York. The question which the commission had before it was whether it possessed the power to raise rates above 5 cents in the face of such franchise provisions. The opinion of the commission reviews at great length the decisions heretofore rendered by the courts of New York State concerning the effect of franchise conditions upon the utility and upon the power of the commission to raise fares above the rate specified. The opinion states:

"We believe that all of the cases dealing with fare conditions in franchises can be harmonized without difficulty. It will be remembered that beginning with the act of 1884 relating to electric railways there was and has been a specific provision in the law requiring the consent given by the municipality to contain a clause setting forth that it is given upon the express condition that the provisions of the act relative to such railroads shall be complied with. Therefore, even though the municipality should give its consent to the

construction, maintenance and operation of an electric railroad in the public streets without attempting to set forth the condition in the franchise relative to fare which is contained in the statute, nevertheless the provision of the statute is binding upon the corporation, and no greater force or effect is given to it and no greater obligation is placed upon it than that which appears in the statute in this respect. The mere reiteration of this condition in the franchise given by the municipality does not place an additional burden upon the corporation, nor does it operate to divest the State of any power which it may have and which it has always had to regulate the fares on electric railways.

"Some of the franchises involved in the present case, as well as others which have been brought to the attention of the commission in similar cases, use almost verbatim the words of the statute with respect to the 5-cent fare, and we think that, notwithstanding this provision has been embodied in a written agreement between a municipality and an electric railway corporation, it only remains in full force and effect as against the State so long as the Legislature or the commission takes no action in regard to the increase or reduction of such fare. Certainly the fact that such a provision was contained in an agreement between the parties could not operate to deprive the State of its sovereign rights without its consent as evidenced through some act of the Legislature."

At another place the opinion says:

"In view of the numerous decisions from which we have quoted at length, we think it is settled beyond question that municipalities have no right to impose conditions in franchises other than those which the statute gives them the power to exact. The fact that conditions restricting the fare within the municipality are imposed in a franchise does not deprive the Legislature of the supreme power to determine what conditions shall be imposed upon an electric railway corporation. There is no decision in any of the courts of this State which attempts to hold that the Legislature in the enactment of general laws governing the creation and operation of railroads, whether street surface or otherwise, has in any respect conferred upon the municipalities the power to fix a rate of fare in a specific amount. It has delegated the power at different times to fix maximum rates, but this was always subject to the right of the Legislature to intervene and revise and alter such rates as might be fixed under the delegated power."

In concluding his exhaustive discussion, Mr. Carr observes:

"The courts are unanimous in holding that the fixing of rates is a part of the police powers of the State and nation, and that public service corporations are entitled as a matter of right to be permitted to charge such rates as will fairly compensate them for the service rendered. We have therefore determined that the commission has power to grant an increase in the rates charged by the Huntington Railroad in the villages and towns in which it operates, notwithstanding the franchise restrictions as to fare and the provisions of Section 181 of the Railroad Law."

The commission was unanimous in its support of Mr. Carr's opinion. Each of the other members of the commission, however, felt constrained to express his individual views. Judge Barhite set forth in his opinion

numerous decisions not cited by Mr. Carr, handed down by the Supreme Court of the United States and by courts of other states, supporting the position which the commission had taken. Chairman Van Santvoord, in one of his characteristic opinions, set forth his views, as to the legal principles which should prevail. He protested that it was "a shock to be told that a contract as to rates of transportation solemnly entered into between a carrier and a municipality and deliberately accepted by the former as a consideration exacted for its right to exist at all . . . is absolutely void." Judge Irvine expressed a similar feeling. They both agreed, however, that such a contract was binding until modified or abrogated, either by mutual consent or by the exercise of the legislative function, either through an act of the Legislature itself or by the Public Service Commission under a delegation of authority.

Chairman Van Santvoord went on to observe:

"I believe that upon reflection this conclusion is bound to receive the larger measure of commendation. Because if these contract and franchise restrictions as to rates are considered void as being against public policy because of the inherent possibility that some day they may incidentally result either in bankruptcy of the enterprise or serious impairment of the service, to the resultant loss or disadvantage of the public, why should not the same reasoning apply to service contracts between lighting companies and municipalities—or, for that matter, between such corporations and their large consumers—or such corporations *inter se*?"

OTHER VIEWS OF THE ASSENTING COMMISSIONERS

Commissioner Emmet, after expressing satisfaction with the reasoning of Mr. Carr and Judge Barhite's opinion, pointed out the implications of the policy which the commission has adopted. He well says: "If the disposition we are making of this case shall be held upon appeal to be a lawful one, it will follow, I suppose—and with efficient state regulation of rates it certainly ought to follow—that conditions of the kind we are here considering, fixing the fares which shall be charged, will no longer be written into electric railway franchises."

Mr. Irvine apparently felt it was necessary to sound a word of warning to public utility operators, in order that they should not overestimate the power and will- ingness of the commission to set aside franchise provisions. He stated:

"It is to be hoped that our decision in this matter will not be taken as an indication that, in respect to matters which may properly be bargained about in connection with the granting of a franchise, the commission has in anywise lost faith in the time-honored rule that a bargain is a bargain, even when one of the contracting parties happens to be a public utility. It would be unfortunate if promoters of new enterprises should feel that hereafter when seeking franchises they may safely agree to almost anything that is asked of them by local boards, without any real intention on their part of carrying out these agreements if they can induce this commission to relieve them of their obligations upon the mere showing that their profits have not been quite as large as they ought to have been.

"However complete the commission's jurisdiction may be, it seems to me that in cases where we are asked to set aside franchise conditions that have pre-

viously been accepted by the applicant, our first duty is to the public, and it would in my opinion be a violation of this duty for the commission to use its powers primarily or exclusively for the relief of private investors who voluntarily accepted stiff conditions in order that they might go into a business from which they expected to derive large profits, and who have since suffered some disappointment in their original expectations. In cases which involve the nullification of rate agreements that were supposed, when they were made, to be absolutely binding on both parties, I think it must appear that substantial benefits will result to the public from the granting of the relief that is sought—or, rather, that substantial injury will be suffered by the public if relief is withheld—before we can act favorably on these applications against the protest of one of the parties to the bargain."

Accounts Not Shrouded in Mystery

IN ANSWER to a newspaper assertion that the financial condition of the Detroit (Mich.) United Railway is "shrouded in mystery," the company has published in

Electric Railway Service, its car bulletin, a detailed, clear-cut description of its accounting procedure under I. C. C. classifications. Furthermore, it used, as an announcement of this, the poster shown in the accompanying illustration.

Many people in some localities probably still believe that corporation books are kept wrongfully; that statements regarding the financial conditions of the properties are not based

THE ACCOUNTS of the D. U. R. are KEPT EXACTLY AS THE LAW DIRECTS

There is nothing "shrouded in mystery" about them—
They are clear, clean and
honest and under Govern-
ment supervision.

ELECTRIC RAILWAY SERVICE

issued Friday Jan. 11

Describes the book-keeping
system.

upon official accounts. For the purpose of combatting such impressions the publication of the fundamentals in the accounting regulations under which the companies work is doubtless of much value.

Efforts to Secure Uniform Boiler Laws

THE American Uniform Boiler Law Society, of which Thomas E. Durban, Erie, Pa., is chairman, is continuing actively to urge the legal adoption of the boiler code of the American Society of Mechanical Engineers. The code has been adopted in California, Indiana, Massachusetts, Michigan, Minnesota, New Jersey, New York, Pennsylvania and Wisconsin. The Boiler Law Society hopes to secure favorable action by the nine state legislatures that are to meet this year. Different plans are being followed in these several states, and the society will appreciate co-operation on the part of electric railway men in securing recognition of this code by legislatures.

Fuel Conservation and Operating Economies

Two Important Documents Are Reproduced as Typical of What Is Being Promulgated in All Parts of the Country

THE office of the ELECTRIC RAILWAY JOURNAL continues to be flooded with reports of efforts in the line of conservation. Space limitations this week preclude the publication of more than two typical examples.

New York Fuel Conservation Committee Formulates Recommendations

The fuel conservation committee for the electric railways of the Second Public Service District has prepared resolutions as requested by the Public Service Commission for this district. The resolutions follow:

1. *Heating of Cars*: As the amount of current necessary for heating is, in most cases, some 30 per cent of that required for the operation of the car, it is recommended to the different operating companies that the heat be shut off during rush hours, morning and evening, on all cars in service, and that the heat be reduced on cars in non-rush hour service, excepting under extremely severe weather conditions.

It is impracticable to comply with the above suggestions in cases of cars heated by other than electric heaters, but economies in the use of coal in these cases could be effected by a more efficient operation of heaters and a closer supervision of their use.

2. *Lighting of Cars*: It is further recommended that the amount of current now used for properly lighting cars be reduced 50 per cent.

3. *General Lighting*: It is recommended that the general illumination of carhouses, yards, rights-of-way, etc., be reduced to the minimum consistent with safety of operation.

4. *Sale of Power*: It is recommended that the sale of power by railway companies for other than railway or other purposes essential to the winning of the war be discontinued where possible.

5. *Consolidation of Power Plants*: It is the belief of the committee that few if any situations exist where consolidation or paralleling of power houses would result in fuel economies.

It is, however, recommended that local conditions be studied by each company, and when economies can be made that arrangements for doing so be perfected.

6. *Stops*: Realizing that large economies in power would be effected by a reduction of the number of stops per mile made by all cars, it is recommended that the local conditions surrounding the operation of each company be most carefully studied with a view to eliminating all possible non-essential stops. Consideration of the skip and stagger-stop systems in this connection is recommended.

7. *Service*: This committee realizes the inconvenience to the public which will be occasioned by a reduction in service, and feels that all service reductions should, as far as possible, be confined to non-rush hours.

With this in mind, and appreciating the grave ne-

cessity of material reductions in order to meet the emergency fuel conditions, brought about by the war, it is recommended that the possibilities of service reductions be most seriously studied and schedules reduced or rearranged in such manner as to accomplish substantial savings with the least possible inconvenience to the public.

8. *Co-operation of Employees*: It is recommended that each company which has not already done so adopt the recommendations of the American Electric Railway Association's War Board and secure, so far as possible, definite pledges from its employees to aid in the fuel conservation movement by every means in their power.

COMMITTEE ON FUEL CONSERVATION,
H. B. Weatherwax, Chairman; J. F. Hamilton,
J. P. Barnes, W. M. Collins,
W. J. Harvie, C. R. Barnes, ex officio.

[NOTE.—Possibly Clause 4 will now require change in view of the fact that the order of the Fuel Administrator on Jan. 17 makes no discrimination between industries which are essential and non-essential for winning the war in the Monday closing rule.—EDS.]

Connecticut Commission Recommendations Were Effective Jan. 15

Henry F. Billings, secretary Public Utilities Commission, State of Connecticut, has sent to the electric railways of the state a circular letter containing recommendations on fuel economy. They were asked to report on the matter on Tuesday of this week. The letter is referred to briefly in the War Board bulletin abstracted on the Association News page in this issue. The full text of the letter follows.

At this time when every vital energy should be so conserved and regulated as to minimize waste and produce maximum efficiency in meeting the necessary demands of our social, industrial and national life, and prove a potent factor in our first and paramount duty of "winning the war," it is opportune to consider street railway transportation and operation, with a view to making more effective its energies to that end.

Street railways are important agencies, not only for the transportation of passengers, but also in the handling of freight. The abnormal industrial development and demands for all kinds of transportation, upon street railway companies as well as steam railroads, has created a condition which the street railway companies, with their limited facilities, are unable to meet successfully, and which calls for unusual and special methods of treatment.

In the large industrial centers of Connecticut, as Bridgeport, New Haven, Waterbury and Hartford, manufacturing government supplies in the factories, employing thousands of men requiring transportation to and from their work at the same time, it is necessary that some system of co-operation be maintained between the transportation company and the factories and their employees whereby traffic may be best facilitated.

From a recent letter issued by the Board of Public Utility Commissioners of the state of New Jersey we quote: "As the industrial plants must have more men than ever, and as it will be impossible for the railways to carry them all practically at one time, it would seem that the problem would have to be solved by an arrangement which would necessitate some readjustment of the working periods in

the shops and shipyards so that all would not start and stop at virtually the same time or within the same hours."

The street railways of Connecticut have about 6000 employees and use about 200,000 tons of coal per annum. Never in the history of this country has there been so great a demand for labor and never so great a necessity for carefully utilizing every ounce of man power. It is of the utmost importance that the energies of these employees be carefully directed in the lines of work most essential at this time, and that the spirit of patriotism augment the efforts of the employees to meet every reasonable demand and emergency.

The necessity for the conservation of fuel and its application to street railways is forcibly expressed by the Federal Fuel Administration in its General Letter No. 18, dated Dec. 1, 1917, from which the following is quoted: "An investigation convinces us that electric railways offer a chance for large savings, particularly through reductions in schedules. We are not suggesting changes in railway schedules which will seriously inconvenience the public, but it is a well-known fact that the pressure of private interests has, in many instances, led the electric railways to provide cars and service which represent a wastage that should be prevented in time of scarcity. . . . We would like to add that all of these companies should be urged to renewed vigilance in the matter of scientific economy in firing their power plants and the cutting off of every kind of leakage and wastage, especially in their transmission system."

Economy should be the watchword and the best possible efficiency consistent with wise economy the purpose which with united patriotic effort will contribute to the nation's success in prosecuting the war.

Patrons of street railways in Connecticut have been remarkably patient with the inadequate service rendered in recent years by companies struggling with only mediocre success to meet the unusual demands made upon them. The best results that may be expected at this time, however, require not only a continuation of that patience but an interested co-operation, with possible readjustment of hours of travel, even at some personal sacrifice. Those who can, should arrange to travel during the hours of normal traffic, and avoid adding to the necessary congestion during the so-called "rush hours" when factory and mercantile employees are obliged to go to and from their work. If it should become necessary or advisable to eliminate certain mid-day schedules as suggested by the Fuel Administration, the hours of travel would have to be adjusted to conform to the revised schedules.

The officials of the street railway companies should be the best qualified to analyze and determine what methods can be inaugurated to meet the economic demands without unnecessary inconvenience to the traveling public or seriously curtailing transportation facilities. We therefore recommend:

1. That the attention of mercantile, manufacturing and industrial institutions be directed to the necessity of co-operation in an effort to bring about a more even distribution of traffic, and a general improvement in transportation facilities.

2. That the attention of motormen and conductors be called to the patriotic duty of saving current and fuel and that their co-operation be enlisted by pledge cards or such other method as may be deemed most advisable.

3. That the officials of all street railway companies in the State make a careful study of the general situation under present war time conditions and put into effect such methods as will more effectively conserve fuel and economize in all labor and material consistent with reasonable service.

4. That each street railway company in the State report to this commission on or before Jan. 15, 1918, the results of its investigation in these matters, and the methods, if any, inaugurated or about to be inaugurated in the interests of fuel and other economic conservation.

Government Requisitions Niagara Power

The United States government has requisitioned electric power generated by the Niagara Falls Company, Hydraulic Power Company of Niagara Falls, and Cliff Electrical Distributing Company. Approximately 110 factories now working on war contracts will curtail their electric power requirements and substitute steam for electricity. About 100,000 hp. more will be imported from Canadian plants to be exclusively used for war purposes.

LETTERS TO THE EDITOR

Another Advocate of the Company Section

THE CONNECTICUT COMPANY,

NEW HAVEN, CONN., Jan. 16, 1918.

TO THE EDITORS:

I have noted with interest the letters from the presidents of the Toledo Railways & Light Company and the Elevated Railroads of Chicago which the *ELECTRIC RAILWAY JOURNAL* has printed recently. As president of another company which has an active and efficient section I take pleasure in adding my testimony as to the importance of this agency for the welfare of employees and the railway companies themselves. It seems to me at the present time that the importance of company section organizations on electric railway properties is greater than at any time in the history of the industry.

By reason of the abnormal conditions surrounding all branches of nationwide activity, the importance of the transportation utility is becoming more apparent, not only to those engaged in the industry, but to the public and administration officers of the government. For this reason we are being called upon more and more to become an efficient aid in the conduct of affairs, and it is necessary to disseminate through the rank and file of the organization information which is being received and demands which are being made upon the electric railway industry.

Without any question the best method of accomplishing these results is through the medium of the company section. The last two or three of our meetings, which have been reported in the columns of the *JOURNAL*, have been illustrative of the educational value of the organization. Last night's meeting, at which Dr. Thomas Conway, Jr., explained to our men the serious nature of the economic problems confronting the electric railway, was typical of what can be done at these meetings.*

L. S. STORRS, President.

Signals Operated at High Speed

NACHOD SIGNAL COMPANY, INC.

LOUISVILLE, Jan. 8, 1918.

TO THE EDITORS:

In your issue of Dec. 22, 1917, page 1128, the statement is made:

"While electric railway signals operated by overhead contactors placed on the trolley wire give excellent protection on lines where the cars are operated at moderate and low speeds, reliance cannot be placed upon the overhead contactors to operate properly at high speeds."

We infer that a failure to operate reliably at high speed refers to a particular manufacturer's type of contactor signals, although it is not so stated. The Nachod Signal Company has had trolley contact signals in service for several years on interurban lines throughout this country, at speeds of 60 m.p.h., and their operation has always been considered satisfactory.

CARL P. NACHOD, President.

*See page 141 in this issue for a brief report of the meeting referred to by Mr. Storrs.—Eds.

Mobilization of Machine Tools for Big Gun Manufacture

Government Faces Shortage in Facilities for Manufacture of Heavy Field Artillery Essential to 1918 Campaign

ELECTRIC railway operators and manufacturers of electric railway equipment who can by any possibility release machine tools which can be used in big gun making are urged by the Council of National Defense to do so without delay. The serious fact is that the government is short of heavy field artillery and there is no possibility of producing these guns without machine tools. Enough of these tools are not available and the machine tool makers cannot produce them in time for use in making guns for the 1918 campaign. It is believed, however, that there are in the country, in shops of all kinds, many tools which could be utilized to better advantage in gun manufacture than upon the work on which they are now engaged. Undoubtedly many tools are being inefficiently used where they are. The government wants these and the Council appeals to the owners to sell or rent them to the government for the period of the war.

Readers of the *ELECTRIC RAILWAY JOURNAL* may be able to help in this emergency either by furnishing tools themselves or by bringing this appeal to the attention of machine shop operators in their acquaintance.

Information regarding available tools should be written or wired to Machine Tool Section of the War Industries Board, Council of National Defense, Washington, D. C.

The essential character of heavy field artillery in relation to assaults is indicated by the following facts. When

heavy artillery is not available to clear the way, to shatter the enemy's defenses, to drive such men as remain deep into the ground shelters, to make a veritable inferno of the region to be captured, the loss in life in the assaulting columns runs up to 40 and 60 per cent. With sufficient artillery preparation, with the front cleared by thousands of high-explosive shells which leave no stone unturned—which tear great craters in the fields and wipe out all traces of opposition—the loss is reduced to but 3 to 5 per cent.

It is not necessary at this time to go into the question of why we are short of guns and tools. The shortage is a fact and it remains merely to decide whether it is better to make some sacrifice now or to be treated as Belgium and other violated countries have been treated. No individual or group of individuals can

determine where the needed tools are and which ones can be spared. Even if this knowledge were available the government would not wish to commandeer a single machine and does not believe that it would be necessary. Voluntary co-operation should suffice. It is true that the electric railways have been hard hit by the war, and further their shops are none too well furnished with heavy tools. If the whole industry, however, can furnish even a few planers, boring mills, milling machines and lathes it will have done something to save the lives of the boys at the front. Time is at a premium in this matter.

The MACHINES Needed

- 60- x 60-in. x 20-ft. planing machines.
- 48- x 48-in. x 20-ft. planing machines.
- 36- x 36-in. x 14-ft. planing machines.
- Nos. 4 and 5 plain milling machines.
- Nos. 4 and 5 vertical milling machines.
- 30-in. x 20-ft. engine lathes.
- 36-in. x 20-ft. engine lathes.
- 4- and 5-ft. radial drilling machines.
- 18- x 130-in. cylindrical grinding machines.
- 10-ft. vertical boring mills.
- 5-ft. vertical boring mills.
- 6-in. floor type, horizontal boring and milling machines.
- 4-in. floor type, horizontal boring and milling machines.

How the Fuel Order Affects the Electric Railways

THE essential nature to the public of electric railway service is recognized in the federal fuel order of Jan. 17, whose purpose is stated to be "to make provision for a more adequate supply of fuel for railroads, domestic consumers, public utilities, and for other uses necessary to the national security in certain parts of the United States." The following sections of the order relate particularly to electric railways:

SECTION 4. On each Monday, beginning Jan. 21, 1918, and continuing up to and including Monday, March 25, 1918, no fuel shall be burned (except to such extent as is essential to prevent injury to property from freezing) for the purpose of supplying heat for:

(a) Any business or professional offices, except offices used by the United States, State, county, or municipal Governments, transportation companies, public utility company, telephone or telegraph companies, banks, trust companies, physicians, or dentists.

SECTION 6. No fuel shall be burned on any of the Mondays specified in the foregoing section for the purpose of supplying power for the movement of surface, elevated, subway, or suburban cars or trains in excess of the amount used on the previous Sunday.

SECTION 9. This regulation is effective throughout the United States east of the Mississippi River, including the whole of the States of Louisiana and Minnesota.

Peter Witt Reports on Trenton

He Recommends Purchase of Fifty One-Man Cars, Introduction of Fare Boxes, Better Maintenance, Purchase of Power and a Number of Service Changes

PETER WITT, formerly street railway commissioner of Cleveland, was recently engaged by the City Commission of Trenton, N. J., to report on the electric railway situation in that city. The report, which was submitted on Jan. 12, recommends, briefly, the purchase of fifty one-man cars, introduction of fare boxes, better maintenance, purchase instead of generation of power, reduction of service on some lines and increase on others and a certain amount of rerouting. For the city the suggestions include better repair and policing of the streets as regards blockades and the erection of certain shelter stations. The car rider is enjoined to move quickly and not to knock.

In the introduction of his report, Mr. Witt comments on the small amount of riding in Trenton. He says that Trenton is a live, progressive, growing city with a population of 125,000, yet the record for 1916 shows rides per capita of only 155. This is a very low figure compared with other cities of the same size, and to increase it is the first thing that needs attention. To do it, he says, calls for heroic treatment, first by the traction officials in making effort as they never made before; secondly, through the assistance of the municipal authorities in the enactment of helpful measures; and last, but not least, by the needed and willing co-operation of the car riders.

MORE CARS AND BETTER SHOPS NEEDED

Mr. Witt finds the double-truck cars too large and heavy for base-table operation and the single-truck cars obsolete and altogether too small for peak-load requirements. To operate them at present he considers an economical mistake, producing a financial loss and failing completely of meeting the needs of the car riders. He recommends the substitution of at least fifty modern cars designed for one-man operation and says: "This will permit the running of more cars, the payment of higher wages to the operators, develop the riding habit and produce a larger net for dividends.

"Next, equip all cars with fare boxes. It will please the honest conductor, for automatically through its use he is relieved of financial responsibility; it puts the near honest beyond temptation, prevents stealing by the crook and will put an end to the cheating car rider who now 'beats his way'."

The tools and shop facilities of the company are also considered wholly inadequate to care properly for the equipment operated. The fire department was called out eleven times in the month of December for the purpose of caring for cars on fire, while the "turning in" of cars while in service because unfit for operation causes an annoyance to the rider and a loss to the company which can be avoided if inspection is made before and not after the trouble takes place.

The company, according to the report, should give up making its own power with antiquated methods and purchase the energy it needs from a plant where modern methods and latest devices are used. It should also substitute for its horse-drawn line wagon a motor-driven vehicle. It is speed that counts when the wire

is down. Also this vehicle should carry "hose jumpers."

Some new special work and considerable double tracking was also recommended, but Mr. Witt points out several lines where the service can be reduced and a few which he recommends should be abandoned. The track, poles and wires from these lines can be used for double tracking those lines where two tracks are necessary. Among those lines on which the service can be reduced is that from Trenton to Princeton, where service should be given every two hours instead of every thirty minutes and where the sale of ticket fares at reduced rates should be abandoned.

WHERE THE AUTHORITIES CAN HELP

Mr. Witt also points out the directions where the city authorities can be of great assistance in getting good service. One of these is to help the company so to regulate the issue of transfers that the practice of some car riders of making a round trip for one fare be made impossible. Other suggestions follow:

"Eliminate all useless and needless car stops. It will save the company money in operation and the car rider time in travel.

"If the streets of Trenton were in a poor condition, there might be some justification for the vehicular use of the tracks, but, having well-paved streets, kept in good repair and cleanly maintained makes this nuisance not only one uncalled for, but intolerable to bear. The place for wagons and automobiles is in the space between the curb and the outer rail. The drivers of vehicles should so be taught. It teaching fails to bring the remedy police activity should commence. All vehicles when standing for the purpose of unloading should stand with and not across the street. The 'road hog' with a vehicle so wide that passing becomes impossible should, by legislative action, be exterminated."

The report also points out that electric cars are often delayed unnecessarily at canal bridges and at steam railroad crossings. The city should see that these delays are reduced. Finally, the city should erect attractive shelters for waiting passengers at four important transfer points. The report states that the city can well afford to build these from the money it receives from the company under the present State franchise tax. In conclusion Mr. Witt says:

WHAT THE CAR RIDER CAN DO

"One more word, and my work is done. The many recommendations above made, if favorably received, cannot be carried out in a day; months will be required. In the meantime co-operate. Have your fare ready. Don't stand on the platform of the car and prevent others from getting on when there is room in the middle. When delay has bunched the cars, don't get on the first one; take the second or the third, as the case may be.

"Don't blame the traction company for everything that happens. Don't criticize your public officials for their failure to change conditions which cause you both inconvenience and annoyance, when their inability to act is caused by laws of your creation. Boost as well as knock. Work as well as kick, so when finis in this struggle is finally written, Trenton will have that which it is entitled to, a traction system equal to the best and with a service meeting every want and fulfilling every requirement."

American Association News

War Board Organizes Traffic Bureau and Appoints E. C. Faber as Manager Meeting in Washington on January 11 Board Issues Bulletin No. 6, Which Contains General Suggestions and Report Items

Traffic Bureau Now Organized

E. C. Faber Is Appointed Traffic Manager—Names of Additional Sectional Representatives Are Given

THE Traffic Bureau of the Electric Railway War Board has been completed under the direction of Britton I. Budd, president Elevated Railroads of Chicago, chairman traffic committee. E. C. Faber, general manager Aurora, Elgin & Chicago Railroad, Aurora, Ill., has been appointed traffic manager. His headquarters will be in the Munsey Building, Washington, D. C.

In addition to the names listed on page 1080 of the issue of the *ELECTRIC RAILWAY JOURNAL* for Dec. 15, 1917, the following have been announced:

Northeastern Military District: F. E. Wood, Portland, Me.; Byron T. Burt, Rutland, Vt.

Southeastern Military District: C. S. Allen, Greenville, S. C.; Frank J. Duffee, Natchez, Miss.

Central Military District: C. A. Laney, Akron, Ohio; F. D. Norviel, Anderson, Ind.; Polk Lafoon, Covington, Ky.; W. S. Rodgers, Detroit, Mich.; Frank J. Hanlon, Mason City, Ia.; F. W. Hild, Denver, Col.; A. M. Paten, Topeka, Kan.

Western Military District: W. H. McGrath, Seattle, Wash.; W. C. Orem, Salt Lake City, Utah.

The plans of the traffic bureau are contained in Bulletin No. 4 of the War Board, just issued. The Bulletin states as follows:

The object of the traffic department is to place such facilities of the electric lines, as may be possible of utilization for the purpose, at the disposal of the government for relief of the present war-time traffic situation.

The bureau will keep in close touch with all government departments having to do with the transportation of men and materials and with the Director General of Railroads and his organization.

It will place before these departments and the Director General all available information, as to the ability of the electric lines to be of service in the quick handling of men and materials.

The traffic manager will inform himself, as far as possible, of all government movements of men or materials and will immediately notify the sectional traffic representatives and the electric railway lines interested. The same course will be pursued in connection with any movements suggested by the steam railroad operating committees.

The War Board has been assured by the steam railroad authorities that they will welcome the assistance of the electric lines in the problem that confronts them.

It is suggested, therefore:

First, that each electric railway manager make, at once, a survey of the conditions in his territory, with the idea of ascertaining the specific things that can be done by his road to relieve traffic congestion.

Second, that each electric railway manager consult with the officers of the steam roads in his territory, in order that a distribution of traffic having for its principal object expeditious movement may be effected.

Third, that each electric railway manager communicate with the traffic representative of his territory according to the list given in this bulletin, as to what movements of men and freight he is prepared to take care of.

In connection with any conference with steam road officers, attention is called to Bulletin No. 42, of the American Railway Association recommending that railroads "encourage . . . co-operation with trolley lines for hauling short-haul freight."

The sectional traffic representatives are expected to thoroughly familiarize themselves with the traffic facilities, both passenger and freight, of every electric line in their territory.

They should post themselves as to rates, routes, steam road connections, and connections with electric railways in adjoining states and with water lines.

They should work to the end of establishing through traffic arrangements on connecting lines, where such arrangements do not now exist.

They should keep in touch with the quartermaster at cantonments, camps, forts, arsenals, etc.

They should, wherever possible, work in conjunction with the state councils of national defense.

Traffic representatives in adjoining states should work in co-operation with each other and with the state or sectional associations in their territories.

It is the belief of the War Board, that existing facilities of the electric lines should be utilized so as to render the greatest possible service, but that any improvements or extensions which require capital expenditure should be approached with great care, as it is evident that any capital expenditure not absolutely essential hampers the government in the raising of funds for purposes of the war.

In general, electric railways can, in many instances, render valuable services in supplementing the steam railroad facilities for short-haul traffic both of passengers and freight; by the movement of recruits, troops and supplies to and from cantonments, camps, etc., and by transporting merchandise around congested points, thus relieving crowded terminals.

E. C. Faber Issues Traffic Questionnaire

THE new traffic manager of the Electric Railway War Board has sent to electric railways a list of questions for the purpose of assembling traffic data for the benefit of the Director General of Railroads. Mr. Faber states that under present circumstances it is the patriotic duty of each American citizen to bend every effort towards relieving the present traffic congestion and towards placing on the highest plane of efficiency every existing transportation facility. This will entail co-operation on the part of everyone concerned, including the public, and this must be constantly borne in mind in any consideration of the subject. It is evident that the electric railways can be used to supplement steam railroad service, thus relieving the steam roads of a considerable amount of short-haul traffic, so as to render steam road cars and facilities available for long-haul business—business which the electric railways are not in a position to handle.

Mr. Faber requests that in furnishing information the railways do not overstate the extent to which they can render such relief, bearing in mind, on the other hand, their duty to make the greatest possible use of the facilities at hand. It is their duty further to increase such facilities whenever they are in a position to do so.

Below are given the questions to which replies have been requested.

What are the cities served, with population opposite each city?

Give names of steam railroads serving same territory served by electric railway lines, indicating after each name the cities, towns and stations served by such steam roads in this territory.

PASSENGER TRANSPORTATION

If any so-called rush-hour service is required in the territory state the extent to which rush-hour service is given by each steam road serving the territory and also state the character and extent of rush-hour service now performed by the electric railways and to what extent the rush-hour traffic now handled by steam roads can be absorbed.

To what extent can the electric railway lines absorb the non-rush-hour traffic now handled by steam roads in the territory served? (Treat each steam road separately.)

State just what relief the absorption of such local traffic would afford the steam roads operating in the territory as to: (1) Number of trains; (2) number of locomotives; (3) number of passenger cars; (4) number of employees.

FREIGHT TRANSPORTATION

If the electric railways can relieve steam railroads, operating in the territory, of any of the local freight (carload or less-than-carload) they are now handling, state in detail the manner in which and amount of relief that can be afforded.

State just what relief the absorption of such local traffic would afford the steam roads operating in the territory as to: (1) Number of trains; (2) number of locomotives; (3) number of freight cars; (4) number of employees.

GENERAL

State briefly a comparison of the proposed electric service with the service now afforded by the steam railroads as to time, rates, location of terminals, and whether the proposed electric service is through (without change of cars) or whether transfer will be required.

Inclose a map showing lines, indicating thereon the steam railroad lines serving the same territory.

State any further suggestions pertinent to the subject matter of this inquiry blank which would offer relief to the steam railroads and which suggestions are not covered by the foregoing questions.

War Board Meets at Washington

THERE was a meeting at Washington of the American Electric Railway War Board on Friday, Jan. 11. All members were present. W. B. Hill, manager California Electric Railway Association, was also in attendance for part of the time and gave the members an interesting account of electric railway conditions on the Pacific Coast.

Among the subjects discussed was whether it would be desirable for the association to hold a mid-year meeting this year. President Stanley had asked the board to give him its views on the subject, in view of its opportunities of observation of national affairs. The board decided to recommend to President Stanley that no meeting should be held at this time.

It was decided to issue a bulletin shortly on the subject of the action of the government in taking over the steam railroads and the relation of this action to the electric lines. There was also a discussion on existing labor shortage and possible means for relieving it, as by the use of women employees or of high-school students during certain hours of the day to serve as conductors.

A considerable part of the meeting was taken up with a review of the activities of the traffic committee. Mr. Budd and Mr. Faber reviewed the work which had been done up to this time by the committee.

War Board Makes General Suggestions

BULLETIN No. 6 of the Electric Railway War Board is dated Jan. 11, 1918. It contains a number of general suggestions and report items. These are summarized in the following paragraphs:

Expenditures for Public Improvements.—Attention is directed to the admonition by federal authorities to the effect that no capital expenditures should be made excepting those essential to conducting the war. To illustrate, two quotations are appended to the War Board's suggestions. The first is from a communication addressed to federal reserve banks by the Federal Reserve Commission. It reads:

"Let the banks tell the people of their communities and their authorities, the mayors and governors, that this is not the time for cities to be spending money on public work; rather they should be considering the suspension of existing work, with the view of releasing men and material for the use of the government and so as not to compete with the government for the savings of the people, thereby weakening the ability of the government to place its loans."

The second quotation is from the annual report of the Secretary of the Treasury, Hon. William G. McAdoo. He says:

"The government must, if necessary, absorb the supply of new capital available for investment in the United States during the period of the war. This, in turn, makes it essential that unnecessary capital expenditures should be avoided in public and private enterprises."

Coal for Electric Railways.—The announcement is made that Col. J. Stanley Moore has been appointed Assistant United States Fuel Administrator, in charge of the coal supply for electric railways. His address is Room 105, Eighteenth and C Streets, N. W., Washington, D. C. He will not attempt to furnish relief to any electric railways unless he has at hand full data as to their requirements.

Co-operation of State Commissions.—New York: Resolutions adopted by a committee appointed at a conference between the Commission for the Second District and representatives of up-state electric railways are reprinted. (See ELECTRIC RAILWAY JOURNAL, Jan. 5, page 42.)

New Jersey: Attention is directed to a circular letter issued by the Board of Public Utility Commissioners mentioning economies possible on the part of electric railways. The Board says: "As the industrial plants must have more men than ever and as it will be impossible for the railways to carry them all practically at one time, it would seem that the problem would have to be solved by an arrangement which would necessitate some readjustment of the working periods in the shops and shipyards so that all would not start and stop at virtually the same time, or within the same hours."

Connecticut: Among the definite recommendations of the Public Utilities Commission of Connecticut were stated to be these:

"1. That the attention of mercantile, manufacturing and industrial institutions be directed to the necessity of co-operation in an effort to bring about a more even

distribution of traffic and a general improvement in transportation facilities.

"2. That the attention of motormen and conductors be called to the patriotic duty of saving current and fuel and that their co-operation be enlisted by pledge cards or such other method as may be deemed advisable.

"3. That the officials of all street railway companies in the State make a careful study of the general situation under present war-time conditions and put into effect such methods as will more effectively conserve fuel and economize in all labor and material consistent with reasonable service.

"4. That each street railway company in the State report to this commission, on or before Jan. 15, 1918, the results of its investigation in these matters, and the methods, if any, inaugurated or about to be inaugurated in the interest of fuel and other economic conservation."

Ohio: Mention is made of the fact that the first official act of W. C. Culkins, on assuming the duties of the newly created office of Director of Street Railroads for the city of Cincinnati, Ohio, was to issue an order abolishing 383 stops formerly required by the city authorities. Another interesting instance of co-operation was found in Columbus, where the City Council, upon application of the Columbus Railway, Power & Light Company, has permitted the installation of the skip stop all over the city, except in the business center.

General: The War Board reports that more than 300 electric railways have executed the economy pledge promulgated by it. Director C. Loomis Allen will appreciate information as to what is being done along conservation lines, and he would also like to receive newspaper clippings indicating the trend of public opinion as it affects electric railways.

Why the Electric Railway Must Have More Revenue

AT THE meeting of the Connecticut Company section held on Jan. 15, Dr. Thomas Conway, Jr., University of Pennsylvania, Philadelphia, Pa., gave an illustrated lecture on the economic position of the electric railways. With the aid of charts showing the increasing ratio of operating expenses to gross earnings, the diminishing margin of safety for funded debt, the decreasing ratio of net earnings to reproduction value, the decreasing ratio of net earnings to cost per mile of track, the decreasing amount of new construction, etc., he impressed his hearers with the critical character of the present financial status of the electric railway industry.

In order to give a local flavor to his subject, Dr. Conway referred in some detail to the testimony presented at the recently concluded hearings held in Hartford before the Public Utilities Commission of Connecticut, to show why the protest of the city of Hartford against the increase in fare from 5 to 6 cents is unreasonable. He urged upon his hearers the necessity for co-operation on the part of public utility employees in spreading among their constituents such facts as those which he presented.

Preceding Dr. Conway's lecture was the usual dinner, during which the members of the section were entertained with vocal music, including selections by a quartet from the Yale University Glee Club. Immediately

after the dinner W. P. Bristol, local manager Hartford division, the new president of the section, made a brief address, in the course of which he presented to his predecessor, W. J. Flickinger, the gavel which Mr. Flickinger had used during his term of office. He also announced the appointment of Mr. Flickinger to serve as director of the section for one year, and read a list of members of the program, entertainment, resolution and membership committees for the coming year.

Mr. Bristol was followed by Mayor David E. Fitzgerald of New Haven, who complimented the executives of the company and its employees on the friendly relations existing. He touched upon the present conditions on the system, pointing out that neither company nor employees could be blamed for existing inconveniences, which were the natural consequence of the troublous times in which we are living. He predicted that a time might come when the people of New Haven will have to put up with much greater hardships, through the inability of the trolley company to operate even as large a number of cars as they are doing at present.

"Sparks" from Toledo

THE joint section of the Toledo Railways & Light Company, representing the national electric railway, electric light, gas and heating associations, is issuing a monthly bulletin which has just been christened with the euphonious and suggestive name *Sparks*. *Sparks* contains eight pages of facts regarding the property, section statistics, an article by Secretary H. Friede on "Why You Should Become a Member of the Joint Section," and general matters of interest. Among the last-named is Dr. Charles W. Eliot's list of twenty-five books which will give any man the essentials of a liberal education. *Sparks* carries no advertising.

The section held no meeting in December, as the regular date came in the holiday season. At the Nov. 28 meeting H. M. Johnson, of the General Electric Company laboratory at Nela Park, gave a demonstration lecture on illumination. He showed, among other things, how the appearance of a picture is affected by the lighting. Marcus A. Dow, supervisor of safety, New York Central Lines, is scheduled to speak at the next meeting on Jan. 23.

The Story of a Severe Storm

AT THE meeting of the Public Service Railway company section, held on Jan. 17, David H. Roszel, division engineer Hudson Division, read a carefully prepared history of the terrific storm which visited this section of the country about the middle of December. He related the meteorological story of the storm, described the efforts made by the company to meet it, gave estimates of the cost of the storm to the company (amounting to \$150,000 or more), and told some interesting tales of passengers who were caught unawares by the suddenly developed ferocity of the storm on the evening of Dec. 11. This paper brought about a lively discussion on snow fighting.

In addition to the technical discussion, a number of humorous and semi-serious stories were told by L. J. Tynan, attorney in the claim department, who closed with a patriotic appeal for co-operation between the men and Public Service.

CONSTRUCTION, MAINTENANCE AND EQUIPMENT

ENGINEERS, MASTER MECHANICS AND OTHERS WHO HAVE DEVELOPED ECONOMICAL PRACTICES, OR WHO HAVE WORTH-WHILE IDEAS ARE INVITED TO TELL READERS OF THE JOURNAL ABOUT THEM IN THIS DEPARTMENT

Using Car Hoists for Changing Wheels

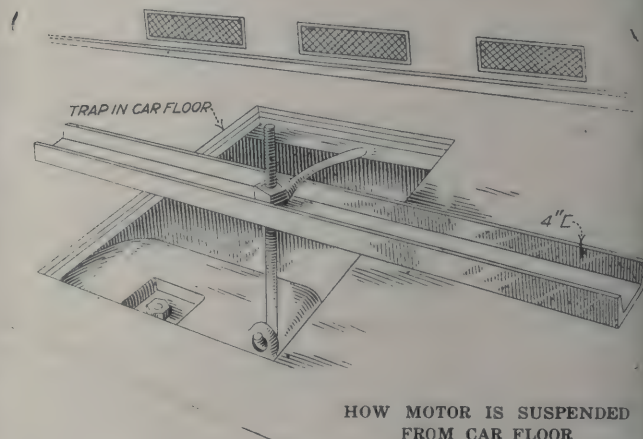
BY KEITH MAC LEOD

Engineer of Equipment, Montreal (Que.) Tramways

THE accompanying halftone shows a method of utilizing a car hoist for the purpose of changing wheels. This method has superseded the use of wheel pits in our carhouses with gratifying results.

The procedure is to place cross beams (supported from the main beams by saddles or links) under the truck end frames, to remove the pedestal straps of the wheels to be changed, to hook up the motors from the car floor, to remove the axle caps and bearings and then to raise the hoist. When the car is raised sufficiently the old wheels are run out, the journal boxes are changed and the new wheels are run under to their proper places. The journal boxes are then guided into place as the car is lowered.

The method of hooking up the motors from the car floor is illustrated in the accompanying sketch. The motor is simply suspended from a channel iron, which is placed across the trapdoor, by means of a hook inserted in the bale on the motor frame. The hook is



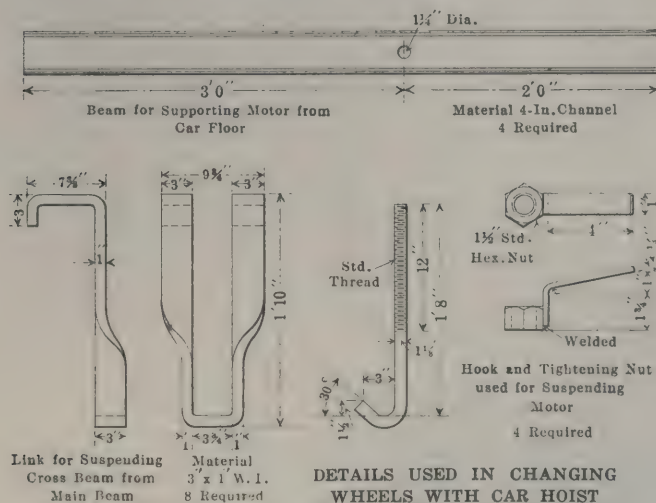
held in place with a special nut screwed on the end which projects up through the channel.

Although there is a saving of time, even for one pair of wheels, as compared with the wheel pit method, the proportionate saving is much greater for two or more pairs. In cases when four axles are to be removed, the relative time required per axle compared with the former method has been found to be roughly one to three.

Aluminum Catenary Construction

IN THE usual catenary construction, the contact system is not depended on for power transmission. Copper wires were formerly used for this service, but where traffic is heavy they have been largely replaced by bronze or steel wires. These wear better, but have poorer conductivity. The necessary conductivity in the catenary system has been obtained on the Lake Erie Northern Railway, as explained in the January issue of the *ELECTRIC JOURNAL*, by wrapping the conductor around the steel messenger cable. This cable consists of seven strands of 0.1118-in. double galvanized extra high strength steel having an elastic limit of 130,000 lb. per square inch. Fifty-four strands of 0.1118-in. hard drawn aluminum are laid in three layers around this steel core. This gives a cross section of 675,000 circ. mils of aluminum having a conductivity of 61 per cent, which is equivalent to No. 0000 B & S gage copper cables. The complete cable including the steel reinforcement weighs 874 lb. per 1000 ft., while two No. 0000 copper cables would weigh 1316 lb. per 1000 ft.

For the contact wire a No. 0000 B & S gage mild steel, galvanized grooved wire, having an elastic limit of 36,000 lb. per square inch, is used. The coefficient of expansion is two-thirds that of copper and the cost about one-third. The contact wire is supported at fifteen foot intervals by galvanized steel hangers and the catenary cable is strung with a deflection of two feet in 150 foot spans. The aluminum strands of the supporting



VIEW OF CAR HOISTED TO RECEIVE NEW WHEELS

Auto Tower Versus Horse-Drawn Tower

In Every Respect the Self-Propelled Tower Has Proved Far Superior to the Horse-Drawn Equipment—Reasons Why This Is So

BY S. L. FOSTER

Chief Electrician United Railroads of San Francisco

AGENTS for self-propelled towers for construction and maintenance of overhead trolley wires have explained volubly the advantages of their appliances over those which are horse-drawn. The favorable financial aspect of the question has already been fully presented, but there has been little in literature to make clear the relative features of the two types of towers in their practical details.

The United Railroads of San Francisco found most of the good points of auto towers after a few days' use of a 2-ton Pierce-Arrow equipment. The hills ceased to have any terrors for the linemen, for, instead of having to be favored on the climbs, the auto readily responded to all demands. Fifteen and 16 per cent grades, which with horse-drawn towers had to be ascended by circuitous routes and necessitated that line-work be done down hill, were easily surmounted by the auto and the work was done up the grade. No more time was lost in watering, feeding or resting the horses or in waiting for the blacksmith to replace torn-off shoes. There was no longer any fear of hurrying lest the driver be scolded for overheating the horses. The auto could proceed on the level or climb the ascents more than twice as fast as the horse-drawn vehicle and, on descending, the only limit was the nerve of the chauffeur or the allowance permitted by the auto guarantee. The camouflage of the fire department crimson color of the rig, the "Auxiliary Fire Apparatus" signs, the siren and the portable fire extinguisher made the auto tower independent of even the traffic officer and his rules.

The danger of overturning on steep hills was also reduced. There was no occasion to turn the auto on a grade, as all maneuvers were managed by backing up

(Concluded from page 142)

cable are protected from abrasion by sheet-steel sleeves provided with flanges between which the loop of the hanger is free to rise slightly when the collector of the car passes under it without lifting the catenary cable. The contact wire and catenary cable are connected by stranded flexible copper conductor every 150 feet.

Joints in the catenary cable are made by steel sleeves of figure-8 section about eighteen in. long. The ends of the steel cable are slipped into the sleeve from opposite ends and the sleeve is then given four or five complete twists. Over the splice of the steel core an aluminum sleeve is placed and the ends are compressed solidly into the strands of the aluminum conductors by means of a portable hydraulic press capable of exerting 100 tons pressure.

Parallel feeder cables are entirely eliminated by this construction, and due to the high elastic limit of the contact wire it is expected that no adjustments will be necessary to take care of temperature differences between winter and summer. A considerable saving in insulators and labor has been effected in addition to the saving of material.

or going ahead at a slight departure from the line of the rails, whereas backing a horse-drawn tower up a steep grade had been out of the question.

When the auto tower was not in motion the lineman-chauffeur was free to assist in the work aloft or on the ground, as there were no horses to watch and no danger of the motive power taking fright or running away.

In pulling out heavy feeder cables the draft by the auto tower was stronger and steadier than by the horses. There was no compunction felt about overloading the auto a little, pushing it to the full limit of its speed or sending it for long trips, and it was found to have more reserve capacity and to be better able to stand all these strains than was the equine equipment. The increased speed available from the auto reduced the time between spans so that twice or three times as many miles of trolley could be inspected or overhauled in a day as was possible with the horse-drawn rig. The bed of the auto was 6 in. lower than that of the horse-drawn tower, thus making material and supplies more accessible to the groundmen and fewer moves were required. As the auto was longer than the wagon bed of the older vehicle, the extension ladders no longer projected beyond the body, but were entirely protected from injury by collision with intercepting wagons, and yet the auto vehicle occupied less longitudinal street space than the former tower plus the horses.

Rubber tires made the riding more comfortable for the linemen than the iron-shod wagon wheels of the former towers. Instead of a wagon driver with the education and instincts of a hostler, the new vehicle was guided by a lineman with mechanical instincts, who rendered intelligent and efficient assistance to the crew when not acting as chauffeur. The range of the operation of the tower when propelled by the auto was greatly increased over that permissible or wise when horse drawn, as its radius of action was limited only by the time available in the working day and not at all by the endurance of the motive power.

On account of the increased speed of the new vehicle it was unnecessary to provide special stabling facilities with supplies of hay, grain and men or to hire horses from outside owners when a special job of construction was to be done at an abnormal distance from the linemen's base. Formerly this practise had to be followed in order to save the energies of the horses and reduce the time of the men employed making the slow trip to and from the work over the strenuous, hilly routes radiating in all directions from the city.

The generous floor and yard space required for the storage, maneuvering and maintenance of the horse-drawn vehicle and for the lodging and feeding of the horses was all saved, as the less offensive auto tower was willingly admitted for shelter at night into an available space in the linemen's quarters and storeroom. This would have been difficult and objectionable with the former type of tower. The whole equipment of the later appliance was thus stored under cover and protected from exposure to the rain, fogs and thieves of the night, which was not so with the older tower. The replenishing of the supplies on the new tower was also greatly simplified and many steps were saved.

The cost for second-story dry loft space, the labor of hoisting and stowing the hay and grain for the horses and the expense of segregating, storing and removing the stable refuse was entirely eliminated. The liquid

fuel for the auto was stored in a tank underground and was filled from the supplyman's portable tank by gravity at no expense. In the case of the auto there was practically no refuse, either offensive or otherwise, to collect, store and periodically remove. The fire hazard was also reduced by the substitution of the engine for the horses, as the gasoline, though more inflammable than the hay, was so small in bulk and was stored so securely under the ground that the probability of its being ignited was less than that of the great lofts full of hay. It was also free from the extensive destruction that grain is subject to from the army of rats and mice so prevalent about stables. Incidentally, the great saving of hay, grain and men and the release of the horses must have their effect in helping us win the war.

Because of the many heavy grades in San Francisco, when equipping with horse-drawn towers, the one-horse wagon was bought and provided with two horses. The gage of the wheels was increased from 4 ft. 8½ in. to 6 ft. to reduce the danger of overturning on the grades. The result of driving this tower along the standard 4 ft. 8½ in. track was that one wheel ran on a rail and the other ran on basalt or granite paved streets, so that the jouncing of these off wheels made the riding very exhausting for the workmen. As the auto tower does not turn on the grades, there was no necessity of this increase in gage and the standard 4 ft. 8½ in. gage was retained. With the Trilby railhead the auto thus had the smoothest possible path for both wheels when running on the car track.

With the 2-ton auto tower costing \$4,000, the two-horse tower costing \$800, and assuming 6 per cent as annual interest, it is necessary to save only about 50 cents per day per auto tower over the horse-drawn tower to equalize the two investments. The running expenses, maintenance and depreciation will vary in different localities, but they are apparently strongly in favor of the auto tower, judging from the very general substitution of the auto for the horses throughout the country.

When constructing an auto tower there are two valuable improvements that can readily be introduced that are well worth considering, namely, the substitution of the three-section tower for the usual two-section kind and the arrangement whereby the tower can be raised or lowered by the automobile engine through the control of the chauffeur from his seat, as will be described more fully in a later article.

Summarizing, the auto tower is preferable because it is faster, cheaper, safer, looks better and is more efficient, has greater power, steadiness and endurance, occupies less room for storage and handling, obviates labor of receiving and stowing food, reduces the fire hazard, eliminates the parasite hazard, consumes no fuel when not in motion, rides more smoothly, requires no additional floor or loft space for fuel or motive power, has no daily refuse to take care of and may help win the war by reducing the consumption of hay and grain and by releasing horses and men for other work.

Some sage said that "familiarity breeds contempt," but in the case of the internal combustion engine driven linemen's tower, familiarity breeds admiration and enthusiasm and the wonder how we managed so long without it.

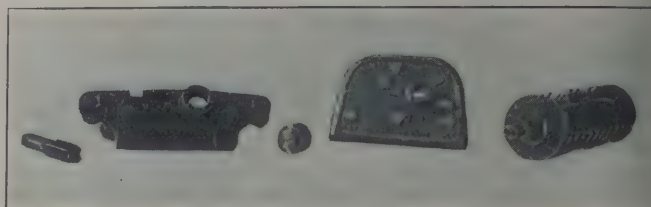
Renewing Worn Controller Parts

BY JAMES W. BROWN

Superintendent of Shops Wilkes-Barre & Hazleton Railway, West Hazleton, Pa.

FOR renewing controller parts which have become worn by the action of the controller handle we have developed a very inexpensive method requiring no new materials. This results in a fine job and makes future renewals easy. To repair the top of a G E-C-36 master controller, the hole for the drum-shaft is first tapped out with a 1-in. tap having fourteen threads per inch. This tap is shown at the extreme left of the illustration. In the hole is screwed a piece of tobin bronze, made from pieces of old power-house pump rods cut off to proper length and threaded. Such a piece ready to be screwed into place is shown in the center object of the illustration below.

A new hole for the drum-shaft is turned by fastening the controller top in a lathe with the large casting



WORN CONTROLLER PARTS RENEWED

shown at the left of the illustration. This is faced on one side and is held against the face plate with two ⅝-in. bolts. On the other side are cast two bosses, which are faced off and drilled to receive two ⅜-in. cap screws for clamping on the controller top. The hole in the casting, to coincide with that to be drilled in the controller top, is bored 1¼ in. in diameter in a large boss, which leaves sufficient bearing surface.

When the holes in the end of the controller shaft are badly worn we place the controller drum, shown at the right of the illustration, in a lathe with one end in a chuck and the end to be renewed in a steady rest. After cutting off 1¼ in. the end is drilled and tapped with a ½-in. standard tap. A piece of ⅞-in. cold rolled steel, with one end machined and threaded, is screwed into the end of the shaft, and the remainder of it is turned down to size, after which the two holes are drilled in the end. To insure this new part remaining in place a ½-in. hole is drilled through it and the drum shaft and into this a steel pin is driven.

Method for Using Old Pinions

The Washington Water Power Company, Spokane, Wash., was recently handicapped by the lack of pinions. There were a number of old worn-out pinions on hand, but no new ones could be obtained without waiting several months. The situation was met by taking the old pinions which had an over-all diameter of 7¼ in., and nineteen teeth, and cutting off the teeth. New teeth were then marked out, giving a pinion 5¾ in. in over-all diameter and having fifteen teeth. For cutting the new teeth a small milling machine was the only available apparatus, and for this reason it was necessary to slot the teeth first and then mill them. The cost of doing the work was a little less than \$5 per pinion.

Advantages of Mechanical Ties

Cushioning and Noise-Reducing Effect Favorably Commented Upon by Public—Light Weight Facilitates Assembling

EXPERIENCE in Dayton with the Dayton mechanical tie in railway track is bringing out some striking features of this equipment in comparison with the more common track construction. The cushioning and noise-reducing effect of this type of construction is brought out by the comments of people along a certain street in Dayton on which one of the tracks is built with the mechanical tie and the other with ordinary wood tie and solid concrete construction. These residents say that there is a noticeable quietness about the track laid with cushioned ties.

A very prominent superintendent of rolling stock pointed out the value of the cushioning effect of the mechanical tie by comparing the effect on the rolling stock operating over open-type track construction on summer days and on cold winter days. He states that when the open-type track becomes rigid due to ice that he has a great deal of trouble with broken trucks. This is undoubtedly the result of the very rigid character of track while frozen, since he does not have this trouble on days when the track is in normal condition.

Another interesting feature of the mechanical tie is that it seems to solve the difficulty of obtaining an interurban car motor suspension spring equally satisfactory for open-type interurban track and rigid concrete-type city track. If the spring is flexible enough to serve the purpose well on the rigid track, it is too flexible for the open track, and if correct for the open-type track it is too stiff for city track. By using the mechanical tie and the type of track construction which it involves, it is plain that approximately the same flexibility can be had in city track as is obtainable in open-type country track. The difficulty with the spring is therefore minimized. The flexibility is partly accounted for by the fact that the $\frac{1}{2}$ in. of asphalt under the tie

chanical tie on curves is a more simple operation than that of installing other mechanical ties. The reason for this is that the bearing surface on each tie is only 8 in. wide, so that the small amount of play left by the spacing of the holes for the rail clips is sufficient to allow for the curvature of the rail between bolts. Owing to the change of the center of bearing on the rail at the curves, the setting of the blocks on the ties is specially arranged for a curve of given radius. All the ties of a given curve are drilled uniformly.

It is claimed that the use of the mechanical tie practically eliminates the necessity for tie rods at curves, because the angle irons really serve in this ca-



SEVEN MEN, PREPARING TRACK, KEEP AHEAD OF CONCRETE MIXER AND SIXTEEN MEN

capacity. The bolts extend through the wood blocks and through the angle irons, which are embedded in concrete, so that the rails could not pull apart without actually pulling the bolt through the angle iron. Where it is desired to install rail slightly tilted, this is very readily accomplished by beveling the wood blocks for the mechanical ties.

One of the features of the tie is the ease and rapidity with which it may be assembled on the job. The weight of 55 lb. is, of course, in its favor in this respect. On one job seven men were employed to dig the trenches for the concrete sill placed along under each tie, lay the rail, fasten the ties to the rails, block the track to grade, etc., and these seven men were able with ease to keep ahead of a 1-yd. concrete mixer and sixteen men employed in concreting a 22-ft. wide street, including the trackway, with a 6-in. slab.

As to the cost of track built with the Dayton mechanical tie, it is claimed on account of the smaller amount of excavation necessary and reduced quantity of concrete required that the cost is from \$2,000 to \$2,500 a mile of single track less than it is with ordinary wood ties set in solid concrete.



MECHANICAL TIES ON 100-FT. RADIUS SPIRAL CURVE

blocks has about the same elasticity, or will compress about the same amount, as the space which is formed underneath the rail by the contraction of the concrete as it hardens and pulls away from the base of the rail. Thus when the asphalt has been compressed an extremely small amount, the base of the rail is brought to bear upon the concrete, thereby making the bearing core solid as it depresses.

It is claimed that the installation of the Dayton me-

Turning Steel Wheels

On the Springfield (Ohio) Railway 34-in. steel wheels are used on all cars. It is the practice to obtain three turnings, but many times the third is rendered impossible on account of the development of sharp flanges. In these cases the flange is built up by use of an electric welder. It has been found desirable, however, to turn the wheel before building up the flange as the metal put on by the welder is so hard the machine tool will not touch it. This operation requires about six hours.

High-Pressure Boilers for Joliet Plant

Operating Pressure of 325 Lb. Per Square Inch, Superheat of 225 Deg. Fahr and New Type of Economizer Described

THE Public Service Company of Northern Illinois has just completed the first unit of its new power house at Joliet, Ill. This has many interesting features, but of most value to railway electrical engineers will be those in connection with the boiler equipment. The station has been built on a carefully chosen site and although at present only one 10,000-kw., 12,000-volt machine is in operation, the plant can be extended in unit sections to an ultimate rating of 60,000 kw. or more. The expected industrial growth between Chicago and Joliet will place the plant in the electrical load center of the present system.

THE HIGH-PRESSURE BOILERS

For each 10,000-kw. generating unit there will be two cross-drum, water-tube boilers, each having 9919 sq. ft. of steam-making surface and developing a pressure of 325 lb., a built-in superheater with 3100 sq. ft. and an economizer containing 6730 sq. ft. of surface. The boiler arrangement is shown in Fig. 3. The intention is to use three boilers to carry the two generating units, leaving one boiler in reserve. This arrangement will supply 1.49 sq. ft. of active steam-making surface per kilowatt of generating capacity, or on a basis of 10

ft. per horsepower. The height from the floor to the top of the economizer is 42 ft.

Two chain grates, each 8 ft. wide, 14½ ft. long and containing 116 sq. ft. of active grate area, are placed side by side in a common furnace. The ratio of the total grate area to the steam-making surface is one to forty-three. The stokers are motor-driven with vertical engines in reserve. An individual self-supporting steel stack, 7 ft. in diameter, rises 125 ft. above the grate. Owing to the low temperature of the flue gases leaving the economizer, the stack is unlined.

HORIZONTAL-TUBE ECONOMIZERS

The all-steel horizontal-tube economizers are of special interest, as they are the first of their kind in this country. Differing from the boiler construction, no drums are used. The headers are of wrought steel and the tubes are 4 in. in diameter, ¼ in. thick and 16 ft. long, of drawn steel, galvanized inside and out to guard against corrosion. The economizer is vertically baffled for three passes, the gases from the boiler entering at the front and from the third pass rising vertically through the induced-draft fan to the stack. The fan has capacity to handle 75,000 cu. ft. of gas per minute at 35 deg. Fahr. At this rating 94 hp. is required. Water to the economizer enters at the bottom of the rear header and passes through 396 tubes, leaving at the top of the front header. The relative flow of gas and water is thus counter-current.

The feed water to the boilers is mainly condensate



FIG. 1—FOUR-MOTOR CRANE WITH 2-YD. GRAB BUCKET FOR UNLOADING COAL. FIG. 2—BUCKET CONVEYOR DELIVERS COAL INTO OVERHEAD BUNKER. FIG. 3—BATTERY OF BOILERS NOW IN SERVICE AT JOLIET PLANT

sq. ft., 1 b.hp. will serve 7.67 kw. The plates in the boiler drum are 1 5/16 in. thick, the longitudinal seam being a butt and double-cover strap quadruple riveted joint.

The heads are secured by two rows of rivets. Tubes of No. 7 gage are used and all high-pressure steam piping is extra heavy and of relatively small diameter. All fittings are of steel, the manifolds used in connection with the boiler leads having been cast and the smaller fittings forged. On pipes above 4 in. in diameter a special bolted joint with a welded seal at the periphery is used. Each boiler with its steel casing, masonry setting and retreating back covers an area of 294 sq. ft., or 0.296 sq. ft. per horsepower of rating. Including the overhang and space occupied by the stokers, the floor space covered is 585 sq. ft., or 0.59 sq.

which has been delivered through a preheater at the top of the condenser containing 1000 sq. ft. of surface, to the heater by either one of duplicate motor-driven condensate pumps. The heater is of the open type, having capacity to serve the two boilers of the unit. Either of two four-stage turbine-driven centrifugal pumps designed to deliver 300 gal. per minute against a head of 375 lb. to 400 lb. feeds the water to the boilers. The turbines are rated at 126 hp. and operate under full boiler pressure, their output being controlled by pressure regulating valves. The water passes through the economizer and enters the boiler at both ends of the cross-drum.

The make-up water comes from a fresh-water reservoir which collects the drips, heat overflow and other available condensed steam. Under float control, it is

also supplied with filtered service water. The house service water supply is drawn from the condenser intake tunnel by two 600-gal. pumps, one driven by a turbine and the other by a motor. It is delivered to a service tank on the roof. From the pump discharge line several taps are taken off for transformer cooling and for various services where raw water can be used. Return water from the tank passes through duplicate pressure filters which are cross-connected and used alternately. Each has capacity to filter 150 gal. per minute. Upon leaving the filter the water supply divides, part going to cool bearings and to the lavatory system, and the rest as needed to the hot-water reservoir. The vacuum on the main unit is utilized to draw the water from the reservoir into the condenser, the amount being regulated by a float in the heater. It is removed by the condensate pump in the usual way and delivered to the heater. With the exhaust steam available the water temperature in the heater under average load conditions will raise from 100 deg. to 120 deg. Fahr. To maintain the temperature within this range a bleeder connection under thermostatic control has been made to the fourth stage of the turbine.

COAL-HANDLING SYSTEM

Coal for the plant is brought in over the company's siding from the Chicago & Alton tracks at a junction about $\frac{3}{4}$ mile distant. The company has its own locomotive and coal cars and a yard at the plant containing five tracks. Between the tracks there is space to store about 10,000 tons of coal inside the power house. One track, centering on the firing aisle, leads into the boiler-room basement over a concrete pit capable of storing 800 tons of coal. By a four-motor traveling crane with a 2-yd. grab bucket, shown in Fig. 1 the coal is unloaded into a four-roll traveling crusher driven by a 50-hp. induction motor. This discharges into a bucket conveyor, illustrated in Fig. 2, delivering into the overhead bunker. The latter has capacity to hold 450 tons or 112 tons per boiler. The bunker is made up of steel plates, concrete-lined, and is divided up into compartments with double chutes from each leading to the two stokers under their respective boilers.

Screenings are handled in the same way, with the exception that the rolls of the crusher are spread to allow the coal to pass through to the conveyor. On both sides of the crusher are by-pass chutes to the storage pit. The coal may be unloaded into the pit or onto the outdoor storage space, in the latter case being handled by a locomotive crane.

Under each boiler are ash and fine coal hoppers. The former is lined with fire brick and is equipped with a sprinkling system to wet down the ashes. These are passed directly to railway cars through a sliding gate, thus eliminating ash-handling apparatus. The fine coal hopper, located farther forward, delivers its contents to the concrete storage pit, the outlet being controlled by a sliding gate operated from the boiler-room floor.

Survey of Grade Crossings

The Illinois Public Utility Commission will make a survey of the grade crossings in the State, in compliance with a law passed by the General Assembly, which requires that special precautions be taken at all especially dangerous crossings.

New Floodlighting Unit

AS a further development of their line of "Golden Glow" and "Crystal Mirror" floodlighting projectors, the Electric Service Supplies Company has placed on the market a new floodlighting unit to be known as type FL-1419.

This new type of projector is particularly designed for short range work where a wide beam dispersion is desired. It is equipped with 14-in., long focus type, parabolic "Golden Glow" or "Crystal Mirror" reflectors which project powerful, dispersed beams of golden light and white light respectively.

In its recent catalog on floodlighting projectors this company classified the different floodlighting subjects into two divisions, namely, those in which the human eye is brought into continuous use to observe detail and those in which the human eye figures only momentarily or where lighting a subject as a whole is the main consideration. For the first classification it recommends "Golden Glow" light and for the latter case the "Crystal Mirror" projector.

The new type, FL-1419, meets a demand for a more powerful projector than any heretofore cataloged by this company, it being adapted to use with 500 to 1500-watt type C Mazda (or nitrogen filled) lamps.



NEW TYPE OF FLOODLIGHT PROJECTOR

What Causes Car Delays

Investigation in Toledo Shows That in One Week Electric Railway Cars Have 926 Waits, Which Waste 12,300 Minutes

IN a recent newspaper article the Toledo Railways & Light Company explained to patrons that they should not be angry when they are forced to wait for cars, because it is not the fault of the company. The article, based upon an investigation made by the company, showed that in an average week the delays resulted in wasting 12,300 minutes, or more than eight and one-half days, but that the great majority of the causes of delay were beyond the company's control.

A. Schwartz, assistant manager of railways, took an average week, Oct. 25 to Oct. 31, and found the car delays in that time resulted from 926 individual delays. There are approximately 5000 car movements a day on the Toledo system.

The biggest cause of delay was railroad-crossing hold-ups. They were responsible for 26 per cent of all delays. Vehicles breaking down in front of cars caused 4 per cent of the delays. Loading passengers was responsible for 12 per cent. This means that many refuse to go forward. Track-construction work caused 4 per cent of the delays; city drawbridges, 8 per cent; waiting at switches, 10 per cent; weather conditions, such as slippery rails, etc., 5 per cent; equipment failure, 10 per cent; trackwork failures, 9 per cent; leaving car-houses, 7 per cent; trolley breaking, 1 per cent, and fire department, 1 per cent.

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

Pittsburgh Study Presented

Transit Commissioner Makes Recommendations After Investigation Carried on During 1917

E. K. Morse, transit commissioner of the city of Pittsburgh, Pa., has presented to the Mayor and the City Council his recommendations as the result of the study which he made of transit conditions in that city. His principal recommendations are the construction of rapid transit trunk lines, extensions to be built as rapidly as warranted, radical changes in the routing of surface cars, the widening of a number of important thoroughfares, and more rigid regulations as to the parking of vehicles. Mr. Morse was appointed transit commissioner of the city on Nov. 13, 1916. The report which he has presented represents the result of the study of the transit problem entered upon by Mr. Morse as soon after his appointment as he was able to organize his forces.

TRUNK LINE CONSTRUCTION RECOMMENDED

Mr. Morse classifies the trunk lines in periods of construction as follows:

First period: A two-track rapid transit line from the south end of the present Mount Washington tunnel to Dallas and Frankstown Avenues via the Mount Washington tunnel, the Smithfield Street bridge, Water Street, Grant Street, Penn Avenue and Frankstown Avenue.

Second period: A two-track rapid transit line from North Diamond Street in Northside to Schenley Park, via West Diamond, Dasher, Stanwix, Diamond and Forbes Streets and Fifth Avenue.

The first trunk line proposed would be largely of elevated road construction and the second mostly subway construction.

Various extensions to both of the foregoing rapid transit lines, Mr. Morse recommends, be carried out as soon as the conditions of traffic and population would warrant the necessary expenditure of money.

FAVORS MUNICIPAL OWNERSHIP.

In line with a statement Mr. Morse recently made before the City Council, as referred to previously in the *ELECTRIC RAILWAY JOURNAL*, he takes a stand in his report in favor of municipal ownership of the proposed rapid transit lines. His recommendation on this point reads as follows:

"That all rapid transit lines be municipally owned but operated by the same company as that operating the surface railways, provided that a satis-

factory agreement between the city and the operating company can be reached.

"That, in case the operating company refuses to co-operate, the city, under authority of the law recommended, complete an efficient transportation system and lease to another private company.

"That, in case the city cannot lease to any private company on satisfactory terms the system be municipally owned and operated."

BROAD STUDY NEEDED

In concluding his discussion of the rapid transit routes which he recommends for construction Mr. Morse says:

"The study of rapid transit should not stop with the recommendations for the immediate future, but should be broad enough in scope to take into consideration the future growth and welfare of the city. The routes recommended form the base on which may be built a comprehensive system of rapid transit, which, with the extensions recommended, will connect the residence districts with the employment, shopping and amusement districts and provide a fast, comfortable and efficient means of transportation for the people of Pittsburgh. It is realized that it is unwise to predict the growth of a city beyond a moderate term of years and therefore the future extensions are only conditionally recommended."

Mr. Morse deals at considerable length in his report with matters very largely of purely local interest or of interest only to those intimately acquainted with the geographical arrangement of the city.

Change in Indiana Commission Procedure

A reorganization of the Public Service Commission of Indiana has been announced. Commissioners Charles A. Edwards and John A. McCardle will hereafter handle all cases affecting steam, interurban and city railways, telegraph and express companies. Chairman E. I. Lewis, who has been handling railroad problems, will hereafter consider cases involving warehouses and heating plants. Commissioner Paul P. Haynes, recently appointed to the board, will handle problems affecting telephone and gas companies. All matters pertaining to electric light and water plants will be considered by Commissioner Edwin Corr. After each commissioner has handled a case to the point where a decision is to be made, the full commission will discuss the matter and instruct some member to write the order.

Severe Storm in Ohio

Both City and Interurban Traffic Hampered by Gale Which Piled Up the Snow

The blizzard which raged over the Middle West on Jan. 12 and 13 played havoc with both steam and interurban schedules. Few of the railroads entering Cleveland operated their trains Saturday night, and all trains through that day were hours behind time.

Traffic on the interurban roads entering Cleveland was greatly hindered and some of the runs had to be cancelled Saturday night. The Cleveland, Southwestern & Columbus Railway did not run any trains Sunday and the Lake Shore Electric Railway operated only between Cleveland and Norwalk. The other roads operated as nearly to their schedules as possible under the circumstances. The schedules of the Cleveland Railway were somewhat demoralized. The temperature at Cleveland was 8 deg. below zero most of the time, and the wind blew at 75 miles an hour.

CONDITIONS ELSEWHERE IN THE STATE

Information from Columbus was to the effect that the Ohio Electric Railway suffered considerable inconvenience on divisions south of that city, but had no trouble on the eastern division. On Jan. 13 all divisions were opened, except a short section near London on the Columbus-Springfield division. Local service over the lines of the company was delayed to a considerable extent.

At Toledo electric railway service was tied up almost completely on Jan. 12, as were all interurban trains. Some little improvement on the city railway was made the following afternoon, but it was thought that it would be twenty-four hours before the interurban lines would be able to begin operation again.

Electric railway traffic at Marion was suspended on Jan. 13 and the town was in darkness that night. Service on both the local city railway lines and interurban roads at Dayton was almost completely demoralized on the evening of Jan. 12. The same conditions prevailed at Tiffin, Mansfield, Bucyrus and almost every other point in the State.

Cincinnati was storm-bound with temperature 16 deg. below zero and electric railway service was badly crippled on Jan. 12 and 13.

The temperature began to rise on Jan. 13 and by afternoon the official thermometer marked around 15 deg. above zero. This gave the roads an opportunity to get the tracks in shape again, although the prospects were that service would be somewhat irregular in many places for two or three days.

Commission Procedure Explained

Chairman Macleod Discusses the "Inside Workings" of Massachusetts Public Service Commission

At a recent hearing of the street railway investigating commission at Boston, Mass., Representative Hays of Brighton questioned F. J. Macleod, chairman of the Massachusetts Public Service Commission, regarding the board's methods of working on regulative problems. Mr. Macleod said that after public hearings were concluded on any matter the procedure depended on the character of the case and just how the case was left on the record. There were a number of cases that were disposed of on the day of the hearing. There were other cases, such as the fare cases, where the subject matter of the hearings was so controversial and where such a large amount of technical testimony was involved, that careful consideration by the commission of the evidence presented and any other evidence which it might be able to secure through its own investigation was absolutely necessary before any intelligent decision could be attempted.

The cases were usually assigned to different members of the commission to make a preliminary report for the consideration of the commission as a whole, and sometimes in a large case different branches or departments of the case were assigned to specific members, the whole report being made the subject of searching and critical examination by every member of the commission before it went out. All the members voted whether or not the order should be issued. No formal records were kept of the proceedings in executive session, but if there was any case where any commissioner desired to dissent from the finding of the majority, a record of the dissent was embodied in the report of the case. If, however, the commissioners were all agreed in the final results no specific record was made of the matters considered in conference.

COMMISSIONERS USUALLY IN AGREEMENT

In answering the question whether most of the orders represented a compromise between the commissioners, Mr. Macleod said:

"In certain phases of the opinion I presume it is true that they do represent in part an adjustment of different minds to the same problem. The commission has usually been able to agree upon the result to be reached, but it is not always in agreement in the beginning as to the exact method of expression in the report. The working out of the report and the phrasing of it in a form to which all the members of the commission can agree are matters that sometimes involve extended discussion and frequent conferences on the part of the commission."

Mr. Macleod knew of no such condition as the domination of the board by a minority. On this point he said:

"The commission is made up of five men, and whatever might be their other shortcomings they are men of very de-

cided convictions, and the result that has been reached has been, as I said before, more or less modified in order to reach some adjustment of conflicting personalities; but so far as I know there have been no serious dissensions in the commission on any matter of consequence, certainly not in the last two or three years."

Representative Hays asked if it was possible as a practical matter for all members of the commission to inform themselves of all questions of detail on matters coming before the board. Mr. Macleod replied that the field was so vast that it was impossible for any member of the commission, no matter what his industry might be, to cover personally the entire field and to feel that he knew the entire situation. The members were obliged to keep themselves informed so far as possible in regard to the most essential factors surrounding the condition of the different companies, and to deal with detailed phases of the company's operation in connection with specific problems presented to the board in specific cases. The chairman took issue with

the implication of Representative Hays that it had taken a long time to settle the rate cases before the board during the last three years, and he challenged that the time taken had been much less than that required by practically any other commission in the country in a case of equal importance. With respect to the Bay State Street Railway rate case counsel for the company had stated more than once publicly that in his opinion there never was a case in the history of regulation in this country where so many important controversial elements had been involved which was decided by a public service commission in so short a time as the Bay State rate case.

FIVE COMMISSIONERS BETTER THAN SEVEN

Mr. Macleod said that the commission was fortunate in having in its membership at this time one man, Commissioner Stone, who had had a long and exhaustive practical experience in the public service field, and also the services of Commissioner Eastman, who had had a long and distinguished career in connection with the investigation of the financial and accounting side of public service companies. The chairman held that a commission of five members was preferable to one of seven.

Better Public Relations

"Make a Friend a Day" Is the Advice of the Vice-President of the Atlanta Company to His Employees

W. H. Glenn, vice-president and operating manager of the Georgia Railway & Power Company, said some very pertinent things to the members of the Gas & Electric Club of that company at a recent meeting. His remarks about public relations are given in part below:

"Sometimes I wish we could forget that word 'company.' What do you mean by 'company?' It is an impersonal kind of thing, which anybody can 'cuss' or anybody can praise.

"I wish we could think of the company as a person, as an individual, and have the public adopt the same thought. For the company is human, after all. Not one human being, but many! What is a company? The stockholders delegate their business to the directors, the directors to the officers, the officers to the superintendents and department heads, these heads to the men on the job. So the company is, after all, just the employees themselves—just you and me and all of us.

BUSINESS DONE IN THE OPEN

"But this company is in a different position from a factory or a store. Our business is done out in the open, far from the supervision of the superintendents. In a factory, an employee in a bit of trouble may call at once on the superintendent for advice and help. Our motormen and conductors are at work in four counties. Our linemen are all over north Georgia. No

one is at hand to give directions when an emergency arises. They must depend upon their own judgment, their own initiative. Therefore, our men must be especially competent to deal with the public. It is an unusual thing to say, but none of our real business is done in this building. Our business is done outside.

"It is a serious business, more so than the ordinary. We handle thousands and thousands of lives every day on our cars. We are responsible for a powerful electric current traversing hundreds of miles of wire. Our business never ceases; our company never sleeps.

PUBLIC OPINION CAN MAKE OR BREAK THE COMPANY

"You have been reminded very often of the absolute necessity of our having the good-will of the public. We depend absolutely upon public opinion. It can make us or break us. We must gain franchises, awarded by city officials who are elected by the people. If the people are against us their attitude is reflected in the officials. It can affect us in the jury box. If a jurymen dislikes the company he cannot help but be influenced in his verdict, no matter how honestly he may try to be impartial.

"What is public opinion? Nothing more than the aggregate of individual or personal opinions. If we could do one big act that would win over public opinion at one sweep, it would be

Pennsylvania Association Meets

Fare Increases, Lighting Standards and Employment of Women Are the Principal Subjects Discussed

An informal meeting of the Pennsylvania Street Railway Association was held at the Harrisburg Club, Harrisburg, Pa., on Jan. 4. The principal subjects discussed were fare increases, possible standards for lighting and cleaning cars, and the employment of women.

The first subject was put on the program because of the fact that a committee of the association of which C. L. S. Tingley, Philadelphia, is chairman has the matter in charge.

The subject of standards for lighting and cleaning cars was suggested because Dr. H. F. Snow, chief engineer of the Public Service Commission, had requested that representatives of the electric railways should appear before the engineers' conference committee at Pittsburgh on Jan. 10 to present the views of the companies relative to certain standards.

The final topic was selected because the problem is one which the railways in the State are facing, but restrictions now imposed by the Department of Labor and Industry on the employment of women may affect some roads.

The meeting was well attended, and while no printed papers were presented and no definite decisions reached, there was a lively discussion on the different points under consideration.

Mr. Shonts on Terminal Problems

Theodore P. Shonts, president of the Interborough Rapid Transit Company, New York, N. Y., was the principal witness at the hearing on Jan. 3 before the West Side Improvement Commission, having to do with the removal of the present steam railroad tracks from the marginal way and streets along the Hudson River. Mr. Shonts stated that he had made a study of the whole problem of port and terminal development at the request of certain banking interests. If the railroads serving New York City would pool their properties or create a new organization and build proper connecting lines to a great common clearance yard the economy in power, coal and wages would be as great as in the West, where by similar

(Concluded from page 149)

easy. But we cannot do that. We must win one friend to-day and another to-morrow and another the day after. It is the only way, and we must never lose an opportunity to make a friend.

"You can't blame outsiders for criticizing what you criticise yourself. The best thing we can do is to do our own work so well that there will be no room for criticism. We do big things well only by doing all the little things well."

arrangements saving as high as 70 per cent has been effected.

Mr. Shonts believed the construction of tunnels would meet the situation much better than a bridge across the Hudson, the cost of which he estimated at \$42,000,000, while tunnels could be built for \$6,000,000 each. He said that subways through the crosstown streets would eliminate much of the present trucking. The tunnels would free the piers and harbor from the present carfloat congestion and leave them clear for ocean steamships. Mr. Shonts said his scheme to improve the city's port and terminal facilities was formulated in 1912 and 1913. He read into the record letters from John F. Stevens and William Barclay Parsons.

Mr. Shonts, as a more immediate method of relieving traffic congestion, suggested that short-haul traffic within a radius of 75 miles from New York City could be handled by motor trucks, perhaps through the agency of the express companies.

Hearings on New Bills Ended

Public Service Commission for the First District of New York Concludes Discussion of Proposed Legislation

The last hearing was held on Jan. 2 under the order of the Public Service Commission for the First District of New York calling for discussion of legislation which it was proposed should be submitted by it or by corporations under its jurisdiction to the Legislature at the present session.

Counsel for the Edison Electric Illuminating Company, Brooklyn, notified the commission on Jan. 2 that those companies did not approve of the commission's proposed amendment to Section No. 66 of the public service commission's law, which would give the commission power to suspend tariffs showing proposed increases of rates for gas and electric companies. The commission possesses such power in respect to transportation companies. The proposed amendment would have the effect of placing the burden of proof for justification of any rate increases upon the companies involved.

Objection was also made to an amendment of the law, which would add to the power of the commission to supervise and regulate the issuance of securities of gas and electric corporations. Arthur G. Peacock, representing the New York Railways, and Herbert J. Bickford, representing the Third Avenue Railway, also objected to similar provisions in respect to the issuance of securities of transportation companies. Mr. Bickford made the point that, inasmuch as the federal government had taken over control of the railroads, new railroad financing might be necessary in the near future under government auspices and the government might be embarrassed by provisions of law which would require lengthy valuations of railroad property. The hearing was then closed.

Joint Operation in San Francisco

Arrangement Suggested for Use of Tunnel by Private Company and Publicly Owned Line

City Engineer O'Shaughnessy of San Francisco, Cal., has made his report regarding a proposed arrangement with the United Railroads for an interchange of railroad facilities west of the Twin Peaks tunnel. The city engineer says that the policy of allowing the United Railroads to operate cars through the tunnel must be decided by the administration. He believes that an equitable arrangement can be made whereby the city's municipal lines will be allowed to operate over the tracks of the United Railroads in exchange for the right of the United Railroads to operate Sloat Boulevard cars through the tunnel.

BASIS OF THE REPORT

The report was the result of a request made by the Board of Supervisors that the city engineer see what arrangements could be made with the United Railroads for affording electric railway facilities to the people who paid for the building of the tunnel. He wrote a letter to General Manager von Phul of the United Railroads, suggesting the use of a part of the United Railroads tracks by the municipal cars past Ingleside Terrace and Westwood Park from the dead end of the tunnel line at the junction of Sloat Boulevard. Also the operation of municipal cars over a part of the United Railroad Parkside system from the dead end at Twentieth Avenue and Tavaral Street.

Sleet Causes Tie-Up at Boston

Heavy sleet and resulting flashovers on the third-rail shoe beam of a train on the Cambridge subway of the Boston (Mass.) Elevated Railway resulted in an interruption of traffic on the morning of Jan. 7 for about an hour and a half. Trouble began when the first eastbound train left Kendall Square station and attempted to traverse the ascending grade on the bridge crossing the Charles River Basin at the foot of Beacon Hill.

Due to flashovers, the shoe beam of the eastbound train leaving Kendall Square became so heated as to cause charring, and the smoke and flashing at the third-rail precipitated a panic among the passengers, many of whom were foreigners. A number of persons jumped through the car windows, much crowding took place, and minor injuries were sustained. During the tie-up and also during two other interruptions which occurred later in the morning from sleet difficulties, of fifteen and twenty-five minutes respectively, inbound and outbound traffic was routed between Boston and Central Square, Cambridge, mainly over the Harvard Bridge lines and Boylston Street subway.

The affair was greatly exaggerated by the local newspapers.

News Notes

Toronto Favors Taking Over Railway.—The ratepayers of Toronto, Ont., voted on Jan. 1 about 39,000 to 3700 in favor of the city acquiring the system of the Toronto Railway in 1921, the year that the present thirty-year franchise of the company expires.

Company to Vote on Philadelphia Lease on Feb. 8.—A special meeting of stockholders of the Philadelphia (Pa.) Rapid Transit Company will be held on Feb. 8 to take action on the proposed lease and agreement with the city of Philadelphia, which has been passed by Councils and approved by the Mayor.

Increase in Wages in Pottsville.—The Eastern Pennsylvania Railway, Pottsville, Pa., has announced an increase of 3 cents an hour in the wages of its crews, making the wage of first-year men 31 cents an hour and those of longer service 33 cents an hour. Two cents an hour will be added to these rates on June 1 next.

Municipal Line to Continue.—At a special session of city officials of Yazoo City, Miss., recently following the presentation of a petition containing the names of between 275 and 300 citizens, it was decided to continue the 4-mile local municipal railway in operation. This decision rescinded the action of the Mayor and the Board of Aldermen in special session some time previously.

Fund for Soldiers Helped.—The International Railway, Buffalo, N. Y., co-operated with one of the local daily newspapers recently by placing tin boxes in each of its cars in which passengers could drop money to be used for the "Smokes for Soldiers" fund. The boxes were placed alongside of the regular fare boxes in each car. More than \$700 was collected during the day.

Trenton Argument Set for February.—Argument will be advanced in the February term of the New Jersey Supreme Court on the writ of certiorari of the Trenton & Mercer County Traction Corporation to quash the indictments returned for the city against the directors and officers of the company for the illegal erection of poles and stringing wires on certain streets of Trenton, N. J.

Action on St. Louis Settlement Postponed.—The settlement ordinance for the United Railways, St. Louis, Mo., was not reported on Jan. 4 at the first meeting of the Board of Aldermen after the holiday vacation. The public utilities committee had not yet passed upon several vital amendments proposed by City Counselor Daues and C. E. Smith, the city's consulting engineer, with the sanction of Mayor Kiel.

Valuation of Lines at Dallas.—The Northern Texas Traction Company,

Fort Worth, Tex., has designated the J. G. White Engineering Company, Dallas, to make a survey and fix valuations on the Oak Cliff lines, owned by the Fort Worth company and leased by the Dallas Railway. The values will be used as a basis for replacement cost after the leases expire. The Dallas Railway and the supervisor of public utilities have approved the appointment of the engineering company.

New Officers for Portland Club.—At the first annual meeting of the Employees' Social Club of the Portland Railway, Light & Power Company, Portland, Ore., held on the evening of Jan. 3, B. F. Boynton, claim agent for the company, was re-elected president for the ensuing year. Other officers elected were A. B. Gottschalk of the planning department, first vice-president; J. F. Roach, instructor of motormen and conductors of the interurban lines, second vice-president; R. R. Robley, electrical operating engineer, secretary and treasurer.

Municipal Ownership Urged for Oakland.—Mayor John L. Davie of Oakland, Cal., in his annual message to the City Council urged that immediate action be taken toward municipal ownership of the electric railways of that city. In line with the proposal he advocated complete revision of the city charter, the appointment of an efficiency engineer to take up the city's transportation work, and the appointment of a committee of citizens to take up the problem. The executives of other East-Bay cities are said to incline toward the opinion that such ownership should be vested in a public utilities district that would embrace the entire transportation system of Alameda and Contra Costa Counties.

First Car Through Twin Peaks Tunnel.—The first passenger car of the San Francisco (Cal.) Municipal Railway passed through Twin Peaks Tunnel on Dec. 31. The run was made from portal to portal, a distance of approximately 3 miles, in six and one-half minutes. M. M. O'Shaughnessy, city engineer, and Fred Boeken, superintendent of the Municipal Railway, rode on the car. They considered the trial trip very satisfactory. It was announced that regular service through the tunnel would start about Jan. 15, with cars running to Sloat Boulevard and Junipero Serra Boulevard. As soon as arrangements with the United Railroads are completed, service will be provided on Ocean Avenue and to the beach.

Commission Seeks to Speed Transit Construction.—In order to speed progress on the construction of some of the new dual system lines, the Public Service Commission for the First District of New York has secured from the priorities committee in Washington promise of priority certificates for steel and other materials necessary for the completion of parts of the system. The committee had at first declined to issue such certificates in respect of orders for steel, which was very much needed. The

commission is particularly desirous of obtaining certain steel for the yard improvements at East New York, Brooklyn, and until this steel is received certain changes cannot be made which will permit the operation of all-steel cars on some of the Brooklyn elevated lines.

Niagara Power Order Affects Railway.—The International Railway, Buffalo, N. Y., will be affected by the order of the war department seizing all of the electric energy produced, imported and distributed by the Niagara Falls Power Company, the Hydraulic Power Company and the Cliff Electrical Distributing Company, Niagara Falls, N. Y. There will be a complete redistribution of electric power among industries in western New York so that war industries will have all the electric power they need. The railway will be forced to rely largely upon its steam-generated power. Fortunately the railway's steam plant has been held in reserve in case of a breakdown in the Niagara Falls power.

New Dallas Power Arrangements.—Under a contract just approved by the supervisor of public utilities of the city of Dallas, Tex., the Texas Power & Light Company will furnish 5000 hp. daily in current to the Dallas Power & Light Company for use in operating the cars of the Dallas Railway. Since the organization of the Dallas Railway under the Strickland-Hobson management, about 30 per cent of the current used in operating the cars of the system, or current for operating the Oak Cliff lines, has been purchased from the Northern Texas Traction Company, Fort Worth, a Stone & Webster company that owns the Oak Cliff lines and the Dallas-Fort Worth Interurban. The Northern Texas Traction Company asked to be relieved of this contract, stating that all its current was needed on its line and at Handley. The new contract effects a marked saving to the Dallas Railway.

Association Meeting Programs

New England Street Railway Club

The meeting of the New England Street Railway Club on Jan. 24 at the Hotel Somerset, Boston, Mass., will be annual "Manufacturers' Night."

National Foreign Trade Council

The executive committee of the National Foreign Trade Council announced that "owing to the railroad congestion and the desire of the council to co-operate with the government in the relief of the situation due to the war," the dates of the Fifth National Foreign Trade Convention to be held at Cincinnati, Ohio, have been changed from Feb. 7, 8 and 9 to April 18, 19 and 20. No change is contemplated in the theme of the convention or in its plan and scope as outlined in the *ELECTRIC RAILWAY JOURNAL* of Jan. 5, page 56.

Financial and Corporate

Reserve Board to Pass Upon New Financing

Plans for New Issues of Securities Are Being Submitted by Private Corporations Voluntarily

Secretary McAdoo makes the following statement:

"In my annual report to Congress, dated Dec. 3, 1917, I referred to the importance at this time of avoiding unnecessary capital expenditures in both public and private enterprises. While no specific authority has been conferred upon me to approve or disapprove new undertakings, a number of corporation executives, bankers and municipal officials, inspired by the idea that they should do nothing which would in any way retard our efforts in the prosecution of the war, have submitted to me plans for new enterprises or new issues of securities.

FEDERAL RESERVE BOARD TO PASS UPON PROPOSALS

"It is now apparent that the government may count upon a full measure of co-operation on the part of the States, municipalities and private corporations, with the result that a large number of such plans for future developments will be submitted from time to time. It, therefore, becomes necessary that each of these proposals receive adequate consideration and that a recommendation be made without delay as to the course to be pursued.

"Pending action by Congress, I have requested the Federal Reserve Board to pass upon such proposals as may be submitted to them or referred to them by me, and advise whether or not such expenditures of capital or such issues of new securities should be made.

CORPORATIONS URGED TO CONFER WITH BOARD

"The board has consented to undertake this responsible work, and I therefore strongly urge upon the corporations and the bankers of the country that before making contracts requiring the use of labor and material, or before placing new issues of securities or agreeing to purchase new issues of securities, they confer with the Federal Reserve Board, in order that it may determine whether the undertaking covered by the proposals is necessary for the public health and welfare, or contributes directly toward winning the war."

Another development in connection with corporate financing is the fact that the bond department of the Equitable Trust Company, New York, N. Y., has announced the details of a plan for economical co-operation among independent bond dealers and banks with bond departments throughout the country. The plan provides for the elimination of a great deal of the local machinery now

necessary in the distribution of securities. It will furnish service to local dealers and banks through a central organization. Many dealers and banks throughout the country have already become participants in the plan, as it meets the necessity for "shortening sail" due to war conditions and the lack of trained bond men.

One prominent dealer said of this plan:

"I now feel that the curtailment of my organization, due to the army draft and stringent conditions in the bond business, will not affect the service I can render my clients. In fact I feel that my service has been vastly improved, and I am better able to meet the competition of the large international bond houses maintaining local offices."

The plan is reported as being adopted rapidly by dealers and banks with every prospect for its success as an economical war measure in the security business.

Pittsburgh Protective Committee

Announcement is made that a protective committee for holders of the bonds of the United Traction Company, Pittsburgh, Pa., and all bonds affected by the default of interest on Jan. 1 of the bonds under the mortgage dated July 9, 1897, has been formed. This committee is composed of Thomas S. Gates, chairman; B. Howell Griswold, Jr., J. R. McAllister, J. H. Mason, C. S. W. Packard, A. C. Robinson and George H. Frazier. The amount of United Traction Company bonds is \$10,000,000 bearing 5 per cent interest and maturing on July 1, 1997. Defaults in interest payments due Jan. 1 last have also been announced in the case of other mortgage bonds of railways embraced in the Philadelphia Company system at Pittsburgh.

In an announcement given out by Brown Brothers & Company and Alexander Brown & Sons, it is stated that immediate notice will be given by the committee of the name and address of the depositaries. All holders of bonds are advised to deposit their bonds promptly in accordance with the terms of such notice.

Unprofitable Track Torn Up

The Dayton, Springfield & Xenia Southern Railway, Dayton, Ohio, proceeded on Jan. 2 to tear up its track between the towns of Beavertown and Spring Valley, Ohio, a distance of 11½ miles. Operation was discontinued on this branch line on Dec. 1. The property has been in operation since 1899 and has hardly paid the operating expenses. It is a branch line connecting with the main line at Belmont. A portion of this branch line from Belmont, 3 miles, to Beavertown has been profit-

able and will be continued in operation.

The authority for discontinuing service and selling the road as junk was granted to the company by virtue of a special act recently passed by the Legislature of Ohio, which conferred the power upon the Utilities Commission to hear cases of this kind and grant release despite any conditions in existing franchises which might ordinarily prevent this. The Utilities Commission, after the passage of the act, heard the case and on Nov. 27 issued an order authorizing the company to stop operations any time after Dec. 1.

Ford, Bacon & Davis Acquire Ithaca Properties

Ford, Bacon & Davis, New York, N. Y., have acquired a financial interest in the Central New York Southern Railroad Corporation, Ithaca, N. Y., and have taken over the management of that property. The company operates a 40.28-mile electric and steam railroad between Auburn and Ithaca, and also controls the Ithaca Traction Corporation, the local electric railway in Ithaca. The Central New York Southern owns four steam locomotives, two electric locomotives, two gasoline motor cars, one electric motor car and fifty-five other cars. The Ithaca Traction Corporation owns forty-one motor cars and three other cars. It also owns the power station which supplies electrical energy to both railway companies, as well as to the electrical lighting company in Ithaca.

Suit Maintains Legality of Indebtedness

A suit to recover \$1,925,000 and interest at the rate of 7 per cent from Dec. 1, 1916, was filed in the U. S. District Court at San Francisco on Dec. 14 against the United Railroads, San Francisco, by the California Railway & Power Company of Delaware. The complaint declares that the sum demanded is the unpaid portion of a \$2,000,000 loan extended on Dec. 23, 1912.

According to Jesse W. Lienthal, president of the United Railroads, the suit was brought with his sanction and does not jeopardize the readjustment plans for the United Railroads. The action was taken merely because the statute of limitations would become operative against the debt on Dec. 14 and it was desired to maintain the legality of the debt for the protection of the noteholders. In the readjustment now under way plans will be included for taking care of this loan.

The complaint declares that the California Railway & Power Company of Delaware on Dec. 23, 1912, extended a loan of \$2,000,000 to the United Railroads in the form of twenty notes for \$100,000 each. The money was to be repaid in twenty equal annual installments. The complaint says that only \$75,000 of the principal has been repaid and that no interest has been paid since December, 1916.

Financial News Notes

Change in Name.—The name of the Ogden, Logan & Idaho Railway, Ogden, Utah, was changed on Jan. 1 to the Utah-Idaho Central Railroad.

New Director for Dayton Street Railway.—Harold E. Talbott, Jr., has been elected a director of the Dayton (Ohio) Street Railway to succeed the late George Schantz.

Preferred Dividend Passed.—The New Orleans Railway & Light Company, New Orleans, La., omitted the regular quarterly dividend on the preferred stock, due on Jan. 1. No dividends have been paid on the common stock of the company since the one made in December, 1916.

New Note Issue All Sold.—Bonbright & Company, Inc., New York, N. Y., announce they have sold the new issue of \$1,500,000 of 6 per cent bond-secured gold notes of the United Light & Railways Company, Grand Rapids, Mich., dated Nov. 1 and due May 1, 1920. The notes were offered at 96½ and interest, yielding 7½ per cent.

Preferred Stock Dividend Passed.—The Waterloo, Cedar Falls & Northern Railway has deferred the payment of its 1917 preferred stock dividend. The earnings do not justify the payment of the dividend and the directors did not wish it paid out of surplus. The company has \$1,106,100 of 6 per cent preferred stock outstanding, which was issued in 1912-1913.

Another Road Suspends.—The Carolina Traction Company, Rock Hill, S. C., operating 3 miles of railway with storage-battery cars, has suspended service. James S. White, secretary of the company, places the blame for the suspension on the present prohibitive prices of materials and supplies. He is reported to have said that he sees no chance for the early resumption of service.

Stock Issue Decreased.—The San Antonio (Tex.) Traction Company has filed an amendment to its charter in the office of the Secretary of State at Austin decreasing its capital stock from \$2,500,000 to \$300. All the assets

of this company were transferred to the San Antonio Public Service Company on Sept. 1, 1917, under terms outlined previously in the *ELECTRIC RAILWAY JOURNAL*.

Sale Under Foreclosure Confirmed.—Judge Cummings in the Northumberland County Court has confirmed the sale of the property of the Northumberland County Traction Company on Nov. 8, 1917, for \$200,000 to Allen P. Perley, John L. Hall and David A. Horne, Williamsport, representing the bondholders. Suit against the company to foreclose was brought by the Philadelphia Trust Company, trustee, under an issue of bonds to the amount of \$400,000.

Road for Sale.—The 16-mile electric line of the Mexico Investment & Construction Company, Mexico, Mo., is being wrecked and the rails, trolley wire, contents of the power house and the cars are being advertised for sale through Judge W. W. Botts, Mexico, Mo., secretary and treasurer of the company, or C. J. Harris, Fullerton Building, St. Louis, Mo. The plan to abandon the property was referred to in the *ELECTRIC RAILWAY JOURNAL* for Nov. 17, 1917, page 921, and Jan. 12, 1918, page 105.

Sale of Fort Wayne Collateral.—Special Master George C. Holt will sell at public auction in New York City on Jan. 28 in one lot \$1,941,000 of the first and refunding mortgage 5 per cent gold bonds of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., dated Sept. 1, 1912, pledged as security for the issue of \$1,146,000 of 6 per cent five-year collateral gold notes of 1914. The property is not to be sold for less than an amount sufficient to satisfy the principal of the \$1,164,000 of notes, with accrued interest, after payment of all costs and expenses.

Common Dividend Passed.—The Little Rock Railway & Electric Company, Little Rock, Ark., has passed the semi-annual dividend of 3 per cent on the common stock payable ordinarily on Jan. 1. The company was at an expense of about \$200,000 in furnishing light, power and railway service to the cantonment at Little Rock, and it is stated unofficially that the officers of the company decided that it was better to put the dividend over and pay for the improvements out of the cash returns than to attempt to borrow with rates for money as high as they are at this time.

Dallas Return Decreases.—The consolidated car lines in Dallas, Tex., under the Strickland-Hobson franchise earned 3.85 per cent on the total investment during the month of November, 1917. In October the company earned 6.17 per cent. The gross earnings were lower by \$29,325 during November than during October, owing to jitneys and the ending of the State Fair. After expenses and required appropriations were taken from gross earnings, the company had a balance of \$24,556 available for the authorized return of 7 per cent on the investment. This figure was \$4,323 less than the net receipts during the same month in 1916.

Interstate Dividend Passed.—The directors of the Interstate Railways, Camden, N. J., have passed the 3 per cent semi-annual preferred dividend due this month. This action followed failure of certain leased companies to pay their rental. They will be given until April 1 to make up the rental before any action is taken respecting the leases. Increased operating expenses are given as the cause of the difficulty. The underlying companies of the Interstate Railways are in four groups operating in and around Trenton, Wilmington, Reading and Wilkes-barre. The preferred stock of the company is cumulative at the rate of 6 per cent amounting to \$60,000 per annum, there being \$1,000,000 of stock outstanding. Until now 3 per cent semi-annually has been paid regularly since the company began operations of the various properties in 1911.

Dividend Passed by Puget Sound Company.—The directors of the Puget Sound Traction, Light & Power Company, Seattle, Wash., passed the dividend normally payable on Jan. 15 on the \$14,793,667 of 6 per cent cumulative preferred stock. Frederick S. Pratt, chairman of the board, issued a statement in which he said that the unusual business activity in the Puget Sound territory had called for substantial capital expenditures by the company and that the increases in the plant had been made at a time when it was impossible owing to the prevailing investment market conditions to finance them permanently on a reasonable basis. The result was a floating debt of \$1,605,000. Other expenditures are in prospect, and the directors believed that the wisest course was to keep the unsecured debt within reasonable limits and to make no distribution to the stockholders.

Electric Railway Monthly Earnings

COLUMBUS RAILWAY, POWER & LIGHT COMPANY, COLUMBUS, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '17	\$359,990	\$286,827	\$73,163	\$45,919	\$27,244
1 " " '16	316,468	184,587	131,881	42,862	89,019
12 " " '17	3,975,871	2,853,469	1,122,402	552,618	569,784
12 " " '16	3,500,760	2,069,138	1,431,622	513,997	917,625

BERKSHIRE STREET RAILWAY, PITTSFIELD, MASS.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '17	\$80,855	\$98,859	†\$18,004	\$26,845	†\$14,764
1 " " '16	80,136	72,091	8,045	27,550	†19,277
11 " " '17	999,813	904,933	94,880	303,030	†200,665
11 " " '16	912,408	757,523	154,885	289,117	†132,099

EAST ST. LOUIS & SUBURBAN COMPANY, EAST ST. LOUIS, ILL.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '17	\$329,267	\$223,856	\$105,411	\$66,944	\$38,467
1 " " '16	278,467	168,019	110,448	63,410	47,038
12 " " '17	3,630,797	2,422,740	1,208,057	779,247	428,810
12 " " '16	2,970,054	1,777,194	1,192,860	754,265	438,595

GRAND RAPIDS (MICH.) RAILWAY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '17	\$100,702	\$77,401	\$23,301	\$18,619	\$4,682
1 " " '16	102,921	67,706	35,215	17,322	17,893
12 " " '17	1,305,807	884,788	421,019	216,010	205,009
12 " " '16	1,290,412	840,470	449,942	181,654	268,288

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

Traction Expert for Buffalo

Incoming Administration Retains Mr. Brackenridge to Survey Traffic Conditions and Report to It

John C. Brackenridge, formerly with the Brooklyn (N. Y.) Rapid Transit Co., has been retained by the City Council of Buffalo, N. Y., to make a survey of traffic conditions on the Buffalo lines of the International Railway. In addition Mayor George S. Buck has appointed a special committee of eight citizens to co-operate in the survey. An appropriation of \$2,000 has been made by the City Council to carry on the preliminary work. This fund is separate from the \$50,000 appropriation granted to the Corporation Counsel with which to appraise the physical properties of the company in the campaign for a 4-cent fare within the city limits.

In his first message to the City Council the new Mayor called attention to the railway service and urged the creation of a bureau of public utilities to deal with the railway problem. This bureau would represent the city at all hearings before the Public Service Commission. The Mayor also pointed out that if private ownership of the railway with public regulation proved a failure, steps will be taken for public ownership.

PRESIDENT CONNETTE EXPLAINS

E. G. Connette, president of the International Railway, has issued a public statement in which he expressed the desire to co-operate with the proposed bureau of public utilities and the newly appointed committee which is making a survey of traffic conditions during the rush hours. Mr. Connette also placed the blame for conditions during the last month upon the weather and the company's inability to secure the new cars which were ordered a year ago.

The police department has been instructed to place patrolmen at all congested points throughout the city to aid in loading passengers and to facilitate the movement of cars. Mounted patrolmen have been placed along the main arteries of travel to keep so-called "track-hogs" from blocking traffic.

Mr. Brackenridge is being retained by the city at the rate of \$50 a day. He has been asked to remain in Buffalo for one month and to make a report to the City Council at the end of each week. Daily reports are also asked on specific work suggested by the Mayor and the members of the citizens' committee.

Soon after the first meeting of the new citizens' committee, Mayor Buck went to Albany for a conference with Governor Whitman in reference to the

railway situation in Buffalo. The Mayor is said to have urged the Governor not to reappoint the two members of the Public Service Commission whose terms are soon to expire. He advocated the appointment of a Buffalo man on the commission.

5,148,063 Potential Competitors

This Is the Total of the Transportation Army of Automobiles That Confronts the Electric Railways

The Chicago *Tribune* of Jan. 6 presented the first detailed figures on automobile registrations in the United States during 1917, wired by its correspondents at the various state capitals after the final tabulations on Dec. 31. Comparison with the 1916 reports shows that 1,629,325 more licenses were issued than during the previous year—an increase of about 46 per cent—and that the number of motor vehicle registrations has reached the amazing total of 5,148,063.

The figures include both passenger cars and motor trucks, many of the states making no distinction between the two in issuing licenses. As nearly as such a count could be made, they represented the actual number of motor vehicles now being operated in the country, for while some few cars have been registered in more than one state, this is more than offset by the fact that some states are just beginning the work of registration. In Texas alone, for example, the authorities estimate that 15,000 cars escaped the operation of the new state motor vehicle law.

Fares Raised in Reading

Six-Cent Fares Extended from Suburban Lines to All City Properties of the Company

The Reading Transit & Light Company, Reading, Pa., put a 6-cent fare into effect on all its city lines in Reading, Norristown, Roxborough and Lebanon on Jan. 10. Fares on the suburban lines were increased to 6 cents on Nov. 6, so that on all the lines the fare unit is now 6 cents. The company issued a statement in which it said:

RAISE FARES OR CURTAIL SERVICE

"It came to a case of either raising the fares or greatly curtailing the service and abandoning all plans for improvements and betterments that we have been carrying out for several years. We realized, too, that our motormen and conductors were deserving of higher wages. Out of the very first additional revenue which we expect to realize from the increased fares, in-

creased wages amounting to \$40,000 a year will be paid out to the men.

"We concluded that the public preferred paying 1 cent more for their ride to any curtailment of the service, as inadequate electric railway service is a poor advertisement for any city.

"What we will realize from the additional cost will not mean any great increase in revenue—nothing compared to our constantly increasing expenses. It will not mean any increased dividends to stockholders. It is hoped that it will yield sufficient to help us bear the heavy burden of increasing operating costs that has been confronting us at every turn for several years and that is becoming greater each day."

Several of the municipalities have filed protests against the increase in fares, and the Public Service Commission has fixed Feb. 8 as the time for a hearing in the matter.

In the meantime the company is issuing receipts to passengers for the additional cent that is being collected, so that if the commission should decide that the 5-cent fare shall be restored, the 1 cent additional can be refunded.

One-Man Cars in Tampa

Safety Features Demonstrated for Public Benefit—Name of Operator on Duty Posted Conspicuously

Fifteen of the twenty-three new type, one-man cars purchased by the Tampa (Fla.) Electric Company were put in operation on Jan. 9.

During the trial run the safety features were shown when Mayor McKay of Tampa was invited to operate one of the new cars for a few blocks. As the Mayor was rounding a turn he lifted his hand from the controller handle to raise his hat to a lady on a passing car, and immediately the emergency brakes were automatically thrown on, the power cut off, the rails sanded and the doors unlatched.

The new cars are the first of the closed type of equipment which have ever been used in Tampa, and during the first day they were crowded with persons trying out the novelty. Much rivalry has existed among the crews for places on the new cars. Another feature of the service is the name of the car operator. This is posted conspicuously toward the front end.

In speaking about the car C. O. Birney said:

"The average passenger load in most cities is about fifteen, and to take care of overloads, this car is designed to seat thirty people, which seems to meet the requirements of 90 per cent of the cities of the country. The car measures 27 ft. 9½ in. over all, is 8 ft. wide and of the continuous sash construction. The body is made of steel, the upper windows are stationary and the lower sash raises in the sides of the car and drops in the vestibules. The trucks are ball bearing with a combination leaf and spiral spring. The motors are also ball bearing and designed for high speed and rapid acceleration."

Hearing on Indiana Freight Rates

Interurban Companies Desire to Put Into Effect Schedule Comparable With That of Steam Lines

The Public Service Commission of Indiana held a hearing on Jan. 4 and 5 in a series of cases involving the petitions of many of the interurban railroads of the State for authority to increase their freight rates on the Zone A plus 15 per cent schedule, which would be comparable to the basis of freight rates now in effect on the steam railroads.

F. D. Norveil, general passenger and freight agent of the Union Traction Company of Indiana, appearing as a witness, was questioned by Arthur W. Brady, president of that company, and introduced several exhibits showing, among other things, a set of terminal costs of freight handling at the Indianapolis freight house of the company.

TERMINAL COSTS AN IMPORTANT FACTOR

Shippers who were present at the hearing and members of the commission immediately sought to find out whether terminal costs at Indianapolis on the average ton of freight handled were greater or less than terminal costs at the stations in small towns along the lines, such as Pendleton or Noblesville.

When Mr. Norveil stated that he could give no exact data on the subject, but declared it to be his opinion that the costs at the smaller terminals were greater than at the larger terminals for each ton handled, Commissioner Edwards pointed out that in a recent rate case before the Interstate Commerce Commission exactly the reverse had been found to be true with reference to the steam roads. Mr. Brady then repeated a former statement to the effect that the interurbans were not comparable with the steam roads.

After many questions by the shippers and the commissioners the companies stated that they would furnish detailed information based on costs of terminal handling of freight and costs of the road hauls and revenues. Mr. Brady said that his road would attempt to show that it is costing the interurbans more to carry each ton of freight than it is costing the steam railroads.

TECHNICAL RATE TESTIMONY

During the continuation of the hearing on Jan. 5 technical testimony was introduced by the companies concerning rates and the elements of costs entering into the interurban freight business, as compared with the same items of cost on the steam railroads. A statement made in a comparison with three of the steam railroads operating in the State showed that the gross revenue per mile of main track of two of these roads was more than \$28,000, while that of the interurban railway was only \$5,533. With an assumed operating ratio of 65 per cent of gross

earnings, the balance available for fixed charges was only \$1,936 per mile of main track in the case of the electric road, as compared with more than \$9,800 in the case of the steam railroads.

Double Stops Eliminated

Investigation by W. C. Culkins, the director of street railroads of Cincinnati, Ohio, on his own motion relative to double stops at various street intersections on the lines of the Cincinnati Traction Company, disclosed the fact that at many street intersections cars made what were known as "safety stops" on the near side and an additional "service stop" on the far side of the street. This practice was the result of the far side stop outside of the business section of the city combined with the necessity of making the safety stops on the near side where the tracks cross those of the other lines, or for other well-established operating reasons. It was found that there were 338 of these double stops which could be reduced to single stops not only without any unreasonable inconvenience to the public but to the great improvement of the service. It was therefore ordered that the Cincinnati Traction Company discontinue the stopping of its cars for passengers at locations specified in the order of Mr. Culkins and remove the white stripes indicating such stops.

Man Shortage in Seattle

135 Men Leave Traction Company Service in Twenty-five Days—Women Will Likely Go on Cars

Officials of the Puget Sound Traction, Light & Power Company, Seattle, Wash., are giving serious consideration to the suggestion of A. L. Valentine, superintendent of public utilities of Seattle, that women be employed as conductors on the cars of that company to meet the shortage of labor. A. L. Kempster, manager of the company, declared that the question would be decided shortly. He said that if women were employed they would receive the same wages as were now paid to the men. Wives or other relatives of former employees of the company now in the military service of the United States will receive the first opportunity. Then will come the wives of men serving the colors. The third class will be general. The company is exhausting every means to retain a complete working force, but to date has been unsuccessful, because of the gradually increasing number of men leaving the employ of the company to engage in shipbuilding or other work where higher wages are paid. Mr. Kempster said:

"We realize that the insufficient service is very annoying and unsatisfactory. We know further that in these times

maximum service should be given, and we want to give it, but we cannot get the men. The only reason that we will hire women, if we do, is because we cannot get men for the cars. The enormous demand of the shipyards and other war industries is rapidly depleting our ranks. From Dec. 1 to Dec. 26 135 men left the service."

Chicago Traction Report

Board of Supervising Engineers, Chicago Traction, Discusses Service Standards

The eighth annual report of the Board of Supervising Engineers, Chicago Traction, covering the period ended Jan. 31, 1915, has just been issued. This contains the usual statement of financial and operating statistics of the surface lines in Chicago and the report of the engineering department covering track extensions, power distribution, electrolysis and cars. There is also a discussion of service standards, most of this material having been used in a report to the City Council some time ago. It is an argument in favor of a standard based on available floor area for standing passengers, and the board is on record as opposing the non-rush standard prevailing in some cities where the companies are required to provide more seats than the average number of passengers during these periods. In this connection the report says:

"When it is considered that to sustain an economic balance between receipts from fares and expenses for operation every empty seat operated during non-rush hours may mean practically a standing passenger during rush hours, it is clear that liberality in service during non-rush hours can be carried to extreme. With a non-rush interval as short as fifteen minutes it is believed that as liberal service has been proposed in this ordinance as is reasonable under existing conditions of operation."

Rehearings Asked in Jitney Cases

Motions for rehearing have been filed in the two jitney cases in Dallas, Tex., recently decided by the Court of Civil Appeals adversely to the jitneys. Both motions renew contentions made by the losing parties in the two suits.

In one case, the Jitney Association was granted an injunction restraining the city from enforcing the ordinance regulating jitneys. This case was reversed and the injunction set aside by the Appellate Court.

In the other case, styled Henry D. Lindsley et al., vs. the Dallas Consolidated Electric Street Railway, in which the railway was granted an injunction restraining the city in enforcing the ordinance initiated by the jitney drivers and adopted on the face of the returns in a referendum election, the Appellate Court continued the injunction in force. The city seeks to have this injunction set aside that it may enforce the initiated ordinance.

New Fares for Spokane

Cut Rate Tickets Done Away with in New Tariffs Filed by Traction Lines

New fare schedules have been filed with the Public Service Commission at Olympia, Wash., by the Spokane & Inland Empire Railroad and the Washington Water Power Company, Spokane, which provide that school tickets shall be 4 cents each instead of 2½ cents, and that the general sale of eleven tickets for 50 cents or 110 tickets for \$5 shall be discontinued. Tickets for pupils are to be on sale only at the general offices of the company. Charges for special cars are to be \$6 for the first hour and \$3 an hour thereafter. Newspapers are to be transported at 25 cents for 100 lb. The regular fare is continued at 5 cents, with transfer privileges. Children under five years of age will continue to be carried free when accompanied by parents.

INCREASE ABSOLUTELY NECESSARY

Waldo G. Paine, vice-president and traffic manager of the Spokane & Inland Empire Railroad, said:

"An increase in our revenue is absolutely necessary to offset the constantly rising cost of labor and material. We cannot continue to sell our only commodity—transportation—for the price established years ago while the cost of doing business grows greater with each succeeding month.

"Our employees are receiving from 20 to 40 per cent more pay than they did five years ago. They deserve it and the company fully realizes that the cost of living has advanced in like proportions. But while the cost of labor has been steadily going up the cost of material has been increasing at an even greater rate.

"While these costs have been climbing we have had no increased revenue for an offset. Instead of that we have been compelled to keep up our service and to buy new equipment, although our passenger business has fallen off, due largely to automobile transportation. It is impossible to lower our standard of service and we have had no side lines to sell—no other commodities which could be pushed on the market at a profit to balance losses sustained on our chief product.

SERVICE AT A LOSS

"These conditions have been growing more and more burdensome and, like other electric railways, we have been considering an advance in rates for a long time. We have been reluctant to take the step, but we believe that when the public knows that we have been operating at an actual loss of many thousands of dollars a year they will see the necessity. Unless our stockholders and bondholders receive some return the business will not be attractive enough to keep up the investment and to better the service.

"The additional revenue produced by discontinuing the sale of tickets is only a small portion of the advances al-

ready granted the men employed on the city lines and other means of increasing the revenue must be speedily found if we are to continue the present service. The solution is either increased revenue for the company or a reduction in the service furnished to the public.

1,700,000 MORE PASSENGERS,
BUT AT A DEFICIT

C. S. MacCalla, vice-president and general manager of the Washington Water Power Company, said:

"The cost of everything going into the business is increasing rapidly. Although we carried 17,305,515 or 1,700,000 more passengers in 1917 than in 1916, we closed the year with a deficit of about \$60,000 on our transportation system, and such a condition as that cannot continue."

Late Milwaukee-Chicago Train Popular

Electric Road Meets a Business Need to Which the Steam Lines Were Not Alive

The Chicago, North Shore & Milwaukee Railroad sensed the need for a late hour fast train from Milwaukee to Chicago, and on Nov. 1 installed a new service which is proving by its popularity that it fills a particular need. Many business men, after completing transactions in Milwaukee, are desirous of taking late trains out of Chicago for other points. The last steam train between the two cities leaves Milwaukee at 9 p. m., so that unless one has completed the purposes of his visit to Milwaukee very early in the evening he is unable to get any of the numerous trains which leave Chicago between the hours of 12 and 3 o'clock in the morning.

The new North Shore train leaves Milwaukee at 11.15 o'clock, and arrives at Evanston, Ill., at 1.15 a. m. It makes only the principal stops en route. On the way the destinations of those passengers bound for points in Chicago are listed by the conductor as he collects fares. Then upon arriving at Central Street, Evanston, the Chicago passengers find a special two-car elevated train awaiting them, which proceeds over the elevated structure, making only those stops required by the passengers, and continuing on to Twelfth Street, the point nearest to the Illinois Central depot. The train is due at this point at 1.45 a. m., so that the 2.10 train on the Illinois Central for Springfield and St. Louis may easily be caught, likewise the 2.15 train on the Michigan Central for Kalamazoo, Jackson and Detroit.

By coming through the city to Twelfth Street, Chicago, all the depots are served within easy walking distance, and by stopping only at necessary points it is possible to make the entire trip from Milwaukee to Twelfth Street in two hours and thirty minutes. An average of 200 passengers are hauled out of Milwaukee every night.

Monongahela Has a Slogan

"Service" Is the Word—In Its Own Paper the Company Tells What It Means

The Monongahela Valley Traction Company, Fairmont, W. Va., has adopted as the design for a slogan and trademark a circle in which is lettered about a monogram of the letters "M. V. T.,"



Railway Gas—Electric—Service." Of the design the company says in part in an editorial in its magazine for the employees: "The design is just a little thing; there are but four

words of the inscription, but to the company and to the men it is one of the biggest things the past year has brought forth. How much it will come to mean to the public that rides on the street cars, that uses power, that consumes gas, will depend on us, individually and collectively.

"It is to be noticed that the dominating word in the design is *service*. Railway—Gas—Electric—*service*. Here are summed up the policies of the company; the aim and inspiration of every man in the organization.

"In introducing this slogan to the public, in making it familiar through the medium of advertising, the company realizes the responsibility it is assuming. To make such a promise to the public and then fail in any particular of living up to its highest conception would be an ignoble defeat. It now rests squarely on the shoulders of every man bearing allegiance to the Monongahela Valley Traction Company standard to see that it is not only kept but surpassed.

"In the railway department it means that safety and courtesy have risen to an even higher importance. The public will be alert to notice to what extent the company's men are imbued with the spirit of the slogan; quick to perceive their attitude toward it either in the breach or the observance.

FROM CUSTOMER TO CLIENT

"In the gas department it means that every employee will further extend himself to make every patron a booster, will further work with the company in doing everything possible toward maintaining irreproachable service. It means that henceforward every person contracting for gas from this company is raised from a customer to a client.

"In the power department it means that the problem of every consumer of power is our problem. Service, expressed concretely in the form of the services of our engineers, in the full co-operation of our organization with the plans of the consumer company, is to be given a new significance.

"Our slogan, carrying with it such obligations, would never have been adopted had we not felt confident that we could deliver the goods.

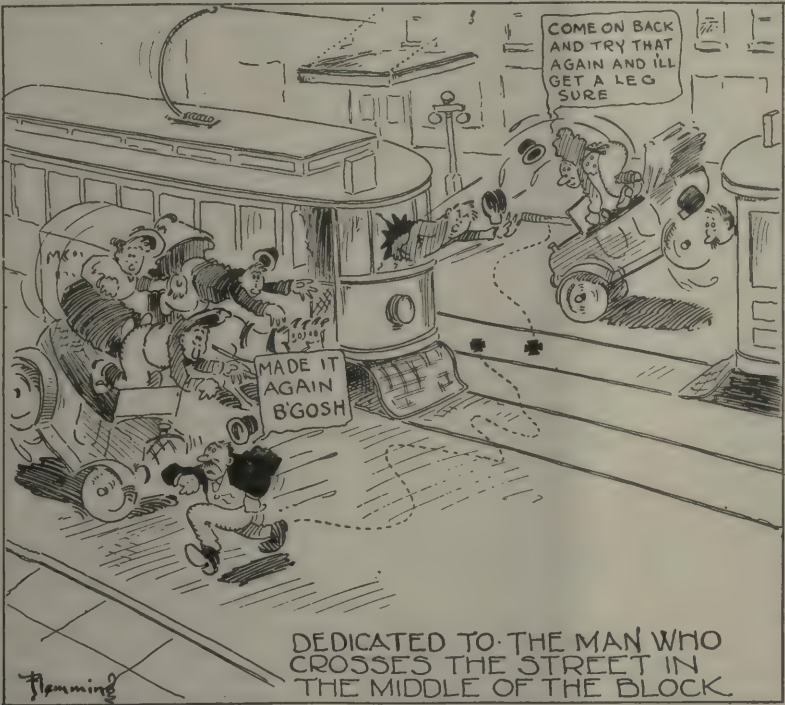
"We've promised something. Now it is for all of us to make it good."

Jay Walker in Cartoon

Well-Known Terror of the Transportation Department Has His Usual Narrow Escape

Jay Walker, the man or woman who crosses the street in the center of the block, has in the past inspired considerable prose and some verse, in addition to much profanity on the part of railway operators. Now the artist has turned his pen on the careless wretch.

The accompanying picture shows how Jay Walker appeared to Flemming, the cartoonist of the Puget Sound Traction Light & Power Company, whose drawings are a feature of *Electrogram*, issued by the company. Jay Walker may escape physical hurt time and again, but unless he is absolutely indifferent to his physical welfare it would seem well-nigh impossible for him not to take to heart the lesson which the cartoon carries.



AN "ELECTROGRIN" IN "ELECTROGRAM"

Census of All Freight Cars

Interstate Commerce Commission Has Issued An Order to All Carriers to Report Their Equipment

The Interstate Commerce Commission, Bureau of Car Service, on Jan. 5 issued an order to all railroads and private car lines as follows:

"The commission desires to determine accurately what freight-loading equipment is actually available for service throughout the country; also that not available for service. To this end you are directed to fill in the information called for by blank space below as of Dec. 31, 1917, and to return this report to the Interstate Commerce Commission, Bureau of Car Service, on or before Jan. 25, 1918.

"Private car lines which have leased cars to other carriers which operate same should show such cars separately, as to individual lessees, as 'cars leased by reporting carrier,' reducing by such number of cars the total number in operation.

"Three copies of this blank are inclosed, one to be returned not later than date mentioned.

"The form, which applies to common box and furniture, ventilated, refrigerator, stock, single and double deck; flat,

drop-bottom, gondola, automobile, solid-bottom gondola, hopper-bottom, tank, and all other freight equipment cars is to be filled out as follows:

Name of carrier.....	.....
Number owned.....	.....
Number leased to reporting carrier.....	.....
Total number in operation.....	.....
Number in actual service.....	.....
Number in bad order, divided—	
(a) Not to be repaired.....	.....
(b) Heavy repair cars which will not be repaired within 30 days.....	.....
(c) Heavy repair cars which will be repaired and in service within 30 days.....	.....
(d) Light repair cars.....	.....
Total number bad order cars.....	.....
Total number in operation.....	.....

"Define carefully the basis which determines whether bad-order cars are classified as heavy or light repair cars."

Agreement on Electrolysis

The City Commission of Trenton, N. J., will sign an agreement with the Trenton & Mercer County Traction Corporation looking toward the elimination of electrolysis from the police and fire cable system throughout the city. The agreement was drawn by E. E. Brownell, who was engaged as arbiter of the dispute.

Rate Case Decided

City the Agent of the State, Which May Change Its Agent, Indiana Supreme Court Holds

The Supreme Court of Indiana on Jan. 11 handed down a decision in the case of the city of Logansport, Ind., versus the Public Service Commission of Indiana and the Logansport Home Telephone Company which is of great importance to all public utilities of the State. Briefly this case was the result of an appeal about a year and a half ago from a case in the Cass Circuit Court, alleging that the Public Service Commission had no authority to increase the rates of the telephone company over those specified in franchise contract with the city, although the company had surrendered its franchise and taken an indeterminate permit.

RATES OF STATE-WIDE INTEREST

The Supreme Court in a lengthy opinion ruled that rates are of statewide interest and not of local interest; that the city in letting a contract, in so far as rates are concerned, acts as the agent of the State and that the State may change its agency and has done so by establishing the Public Service Commission; and that a city and the inhabitants of a city have no rights in a franchise contract fixing rates which cannot be changed or modified by the Public Service Commission which in that respect acts as the representative of all the people. The court further ruled that the powers of the commission are not limited by the provision of Sec. 7 of the Utility Commission Act regarding maximum rates under existing franchises and that this provision simply prevents the company that holds a franchise from increasing rates beyond those fixed in the contract without first obtaining the consent of the commission.

COMPANY WANTS FARE CASE RECONSIDERED

The Indianapolis Traction & Terminal Company as a result of this decision of the Supreme Court appealed to the Public Service Commission on Jan. 15 to reconsider its decision which was upheld by the Circuit Court on Jan. 2 and assume jurisdiction in the petition of the company for a straight 5-cent fare in Indianapolis. The commission states that as the Indianapolis fare matter has been taken to the courts it will wait for a decision of the Supreme Court in that case, but that it will request the Attorney General of the State to assist in having the court reach an early decision.

Chairman Lewis of the commission stated that he believed the Indianapolis and the Logansport cases were not parallel, as the Logansport Home Telephone Company was operating under the general act of the State Legislature while the Indianapolis Traction & Terminal Company was operating under the special act passed in 1899 applying specifically to that company.

The Circuit Court decision in the Indianapolis case was referred to in the *ELECTRIC RAILWAY JOURNAL* of Jan. 5, page 59.

Transportation News Notes

Flat Rate for Rockford Line.—The Public Utilities Commission of Illinois has granted the Rockford & Interurban Railway authority to increase passenger rates to 2 cents a mile straight.

Five-Cent Fare Sought in Lynchburg.—The Lynchburg Traction & Light Company, Lynchburg, Va., has asked the State Corporation Commission to discontinue the sale of six tickets for 25 cents and sixteen school tickets for 50 cents and to establish a straight 5-cent fare.

New Freight Station at Worcester.—The Worcester (Mass.) Consolidated Street Railway has started a freight service from its new freight house on Shrewsbury Street. The Green Street station will continue to be maintained for freight from Boston, Marlboro, Hudson and intermediate places over the lines of the Bay State Street Railway, Boston.

Women Conductors for Long Island Line.—W. W. Lowe, superintendent of the Manhattan & Queens Traction Company, New York, N. Y., has announced that the company will employ young women as conductors on its line running from Long Island City to Jamaica and on an industrial line from Manhattan to the heart of the factory section of Long Island City.

Six-Cent Fare Bill Introduced.—A bill authorizing the Boston (Mass.) Elevated Railway to charge 6-cent fares has been filed in the House by Representative Rowley of Brookline. The bill stipulated that the extra cent shall be paid to the city of Boston in lieu of other taxes, the city to utilize the funds for maintenance of subways, tunnels and other ways along the lines of the company.

Wholesale Jitney Arrests in Houston.—More than forty jitney drivers in Houston, Tex., were arrested by the city police, and the jitney line operating to Camp Logan, the National Guard Cantonment, was put out of business on Jan. 2. The jitney drivers were arrested for not having paid the license fee and obtained license for the new year. They had been notified that new licenses would be required.

Women Guards for Another Line.—C. S. Klumpp, general superintendent of the Hudson & Manhattan Railroad, operating the tubes under the Hudson River between New York and New Jersey, has announced that the company proposes to use women guards. It is not the intention of the company to displace any men now working, but simply to substitute women as it becomes necessary to do so when men leave for military service or other causes.

Fenders Approved.—George B. La Barre, director of public safety of Trenton, N. J., has made an investigation of the fenders in use on the cars of the New Jersey & Pennsylvania Traction Company and the Public Service Railway and reports that he found them to be the proper kind. It had been reported to the City Commission that the fenders were not of the kind approved by the Mayor under an old ordinance.

Fare Hearing Postponed.—The hearing on the petition of George Bullock as receiver for the Buffalo & Lake Erie Traction Company for permission to increase the rate of fare charged passengers on interurban cars of that railroad to 2½ cents per mile has been postponed to a date to be hereafter fixed. The hearing was originally scheduled to be held before the Public Service Commission of the Second District on Jan. 2.

New York Streets More Dangerous.—According to figures given out by the Police Bureau of Statistics of New York City 26,145 persons were injured in the Greater City last year against 24,464 for the year previous. Of the victims, 480 were killed or injured last year as compared with 406 the year before. Electric railway cars were credited with injuring 1940, eighty-four of them fatally, last year, against 1811 injured and seventy-four dead the year before.

Reduction in Owl Service Sanctioned.—Both branches of the City Council of Providence, R. I., on Jan. 8 passed a resolution which, if signed by the Mayor, will practically wipe out all-night car service on the lines of the Rhode Island Company in Providence. It calls for the removal of seventy-seven cars running after 12.30 o'clock in the morning. Cars running from Providence to Pawtucket via Main Street and Pawtucket Avenue will be affected if the measure becomes effective.

Increase in Fare in Oklahoma.—The Oklahoma Corporation Commission has authorized the Shawnee-Tecumseh Traction Company to charge a fare of 15 cents each way between Shawnee and Tecumseh. The fare heretofore has been 25 cents for one round-trip passage. The company showed to the satisfaction of the commission that it could not operate at a profit with a fare of 12½ cents each way. The company has also been authorized to abandon and take up certain portions of its tracks in the outlying districts.

Flat Five-Cent Fare in Salt Lake.—The Public Utilities Commission of Utah handed down a decision recently authorizing the Utah Light & Traction Company, Salt Lake City, Utah, to discontinue on Jan. 1 the sale of 4-cent commutation tickets and to charge a straight 5-cent fare. There will be no change in the conditions governing the issuance of transfers. Provision is made for the redemption of outstanding tickets upon presentation at the office of the company on or before

Feb. 28. Slight modifications were also authorized by the commission in the Sandy-Midvale and the Centerville interurban zone charges.

Fare Increase Authorized.—The Public Service Commission of New Hampshire has granted permission to the Dover, Somersworth & Rochester Street Railway to increase rates for each fare section from 5 cents to 6 cents. A request for the withdrawal of the transfer privilege in the Blackwater section was refused by the commission. The commission, however, has approved a tariff which provides a 9-cent fare for regular passengers, an increase of 4 cents, and a 4½-cent fare in lieu of the present 2½-cent fare for school children.

Loose-Fingered Conductors Sentenced.—Six conductors employed on the Jamestown (N. Y.) Street Railway have been arrested charged with conspiracy to rob the company. When arraigned in court all except one entered pleas of guilty. Three were fined \$50 each and sentenced to the penitentiary for three months. The cases against the other three are still pending. It is charged the conductors exchanged transfers, enabling them to keep the cash fares and register transfers. It is alleged that the men were holding out more than \$25 a week.

Flat Fare in Greensboro.—With the consent of the City Commissioners of Greensboro, N. C., the North Carolina Public Service Company has discontinued the sale of tickets at reduced rates and now charges a flat 5-cent fare for each passenger more than five years old. The company has been selling tickets at the rate of ten for 25 cents for children, eight for 25 cents for college students and others engaged at college, eight for 25 cents for workmen, and six for 25 cents good at all hours. The company will continue to give transfers under the system that has been in use.

Company Loses Owl Fare Case.—The Supreme Court of Pennsylvania in a decision handed down at Philadelphia on Jan. 7, upheld the Superior Court, which recently decided that the Pittsburgh Railways had not given sufficient time before inaugurating a 10-cent night fare. The Superior Court upheld the Public Service Commission in its decision that the company could not increase its fares at night on the ground that it had not given the public proper notice of the proposed change. No opinion was expressed either by the commission or the court in regard to the authorization of an increase in rates.

New Elevated Cars in Use in Brooklyn.—The Brooklyn (N. Y.) Rapid Transit Company has placed fifty new steel 67-ft. passenger cars in service on the Broadway elevated line in Brooklyn for operation between Chambers Street, Manhattan, and Manhattan Junction in Brooklyn. The new cars are longer than the cars in the subway operated by the Interborough Rapid Transit Company. They have three

side entrances, but no end entrances. Cars of the same type which have been in service for some time in the Fourth Avenue subway in Brooklyn have been described in detail in the *ELECTRIC RAILWAY JOURNAL*.

North Kankakee Lines Cleared Snow.—W. H. Baker, president of the village board of Bradley, Ill., writes to this paper under date of Jan. 9: "A heavy fall of snow and sleet struck our village Sunday night and continued until Monday afternoon. The steam roads were greatly behind schedule. But we have to take our hats off to Mr. Windal, manager of the North Kankakee Electric Light & Railway Company, for the good service rendered with a snowplow of C. G. Windal's invention. The tracks were kept open during the storm. Mr. Windal has been with this company for the last eighteen years, and shows he is fully competent to take care of his work under all conditions."

Ordinance to Increase Speed Limits.—As a protection to the railways against damage suits growing out of collisions with vehicles, Supervisor of Public Utilities N. M. Baker of Dallas, Tex., has recommended to the City Commission that an ordinance be enacted limiting electric railway cars to a maximum speed of 15 m.p.h. on the downtown business streets and to a maximum of 25 m.p.h. in the residence district. An old ordinance in Dallas limits cars to a speed of 8 m.p.h. in the business district and 12 m.p.h. in the residence sections of the city, but on account of the absurdity of holding cars to this schedule this ordinance is not enforced. As a result of this ordinance many verdicts in actions for damages against the company have been rendered for the plaintiffs in the courts, where no judgment could be secured under the proposed new ordinance.

Live Stock Haul Increased.—A very large increase in the volume of livestock hauled to the city by the Louisville & Interurban Railroad has resulted from an extension by the company of a line into the Bourbon stockyards, the livestock market in Louisville. The company began to handle a considerable amount of livestock several years ago when the foot and mouth epidemic was being combated. It was then necessary to unload at the freight station or transfer to wagons 2 miles or more from the stockyards. The line into the stockyards increased the company's facilities and has been appreciated by the shippers. Many of them drive their stock overland to the terminal points of the lines out of the city and there load on the cars. The growers are enabled to rush their stock to the market rapidly and do not chance the losses in condition otherwise possible. Two hours from farm to market is the maximum on any of the company lines. The Louisville & Interurban Railroad is controlled by the Louisville Railway, operating in the city proper. It operates railway lines totalling 100 miles of road.

Personal Mention

D. B. Marcus has resigned from the Chicago, North Shore & Milwaukee Railroad, Chicago, Ill., to become assistant traffic manager of the Mitchell Motor Car Company, Racine, Wis.

John F. Brill, a dispatcher with the Public Service Railway, Newark, N. J., has been appointed supervisor of the Trenton-Newark line of the company to succeed Thomas P. Burke, resigned.

Sidney Withington is acting electrical engineer of the New York, New Haven & Hartford Railroad, New Haven, Conn., succeeding P. J. Kearny, who resigned to enter government service.

William Musgrave, superintendent of transportation of the Omaha & Council Bluffs Street Railway, Omaha, Neb., has been appointed superintendent of buildings and grounds of the company.

Guy E. Tripp, heretofore chairman of the Westinghouse Electric & Manufacturing Company, has been appointed head of the division of production in

Clyde Taylor, who has been acting as president of the Kansas City (Mo.) Railways in the absence of Philip J. Kealy on military duty, has resumed his work as general counsel for the company. Mr. Taylor is also vice-president of the company.

Charles E. Walmer has taken over the work of Henry M. Stine as secretary and treasurer of the Pennsylvania Street Railway Association during the absence of Mr. Stine in the service of the government as captain of Company L, 112th Infantry.

Frank P. Hudson has been appointed superintendent of transportation of the Omaha & Council Bluffs Street Railway. Mr. Hudson has been connected with the company since 1892. He was formerly division superintendent in charge of the lines of the company in Council Bluffs.

C. A. Jefts has resigned as assistant superintendent of the Concord, Maynard & Hudson Street Railway, Maynard, Mass. Mr. Jefts has been with the company for four years. Before that he was division superintendent of the Worcester Consolidated Street Railway and of the Warren, Brookfield & Spencer Street Railway at Clinton.

P. J. Kearny resigned recently as electrical engineer of the New York, New Haven & Hartford Railroad, New Haven, Conn., to become connected with the ordnance department at Washington. Mr. Kearny was graduated from the Massachusetts Institute of Technology in 1903. He entered the service of the New York, New Haven & Hartford Railroad in 1906 as assistant to the electrical engineer.

H. B. Sewall, who has long been connected with Stone & Webster properties in the Central West and in the South and Southwest, has been appointed manager of the Whatcom County division of the Puget Sound Traction, Light & Power Company, with offices at Bellingham, Wash. He succeeds Leslie R. Coffin, who, as noted in the *ELECTRIC RAILWAY JOURNAL* for Nov. 24, was ordered to report for duty at Philadelphia.

Thomas P. Burke, who resigned on Jan. 1 as supervisor of the Trenton-Newark line of the Public Service Railway, was tendered a banquet at the Hotel Klein, New Brunswick, N. J., recently, by the members of the Public Service Railway Company Club. One hundred guests were present, including several officials of the railway. Inspector Patrick Creamer, of Perth Amboy, acted as toastmaster. He presented Mr. Burke with a handsome diamond ring on behalf of the employees. Division Superintendent J. J. Gettings and General Superintendent Newton W. Bolen were among those who addressed the diners.



G. E. TRIPP

the ordnance department of the United States Army. He has already entered upon his duties, and the board of directors of the Westinghouse company has given him a leave of absence for the duration of the war.

F. D. Hain, who has been superintendent of construction of the Altoona & Logan Valley Electric Railway, Altoona, Pa., has been elected engineer of the city of Altoona by the new City Commissioners.

Max Thelen was re-elected president of the Railroad Commission of California at the annual meeting of the commission on Jan. 2. This will be President Thelen's fourth term as head of the commission.

L. C. Mims, formerly city dispatcher for the Northern Texas Traction Company at Fort Worth, Tex., has been promoted to the position of assistant to the superintendent of transportation at the central offices of the company.

Charles N. Black of Ford, Bacon & Davis, New York, N. Y., has gone to Washington to become assistant manager of the procurement division of the ordnance department, under Col. Samuel McRoberts, recently of the National City Bank. Mr. Black is a past-president of the American Electric Railway Association, and up to about a year and a half ago was vice-president and general manager of the United Railroads, San Francisco, Cal.

T. J. Day has been appointed general freight agent of the Pacific Electric Railway, Los Angeles, Cal., succeeding to part of the duties performed previously by D. W. Pontius. Mr. Day has been in the service of the Pacific Electric Railway for ten years, and has had twenty-eight years of railroad experience, beginning with the Denver & Rio Grande Railroad. He was formerly assistant in charge of freight operation of the Pacific Electric Railway.

Henry M. Stine, secretary and treasurer of the Pennsylvania Street Railway Association, has been appointed captain of Company L, 112th Infantry, United States Army. He was stationed at Camp Hancock, Augusta, Ga., but has recently been transferred to Camp Wadsworth, S. C. During his absence in the service, his work as secretary and treasurer of the Pennsylvania Street Railway Association has been taken over by Charles E. Walmer.

O. A. Smith has been appointed general passenger agent of the Pacific Electric Railway, Los Angeles, Cal., succeeding to part of the duties performed previously by D. W. Pontius, now general manager of the San Diego & Arizona Railroad. Mr. Smith was formerly assistant to Mr. Pontius. He is thirty-two years old. He became connected with the Pacific Electric Railway nine years ago, going to that company from the Missouri, Kansas & Texas Railroad.

Col. Philip J. Kealy, president of the Kansas City (Mo.) Railways, returned to Kansas City from Camp Doniphan on Jan. 5. It is possible that after a few weeks in a hospital he may remain in Kansas City, in active charge of the railway system. Colonel Kealy is and has been active, but his physical condition is such that he may not be able now to pass the necessary physical tests for continuation in the army service. He has been at the head of the 138th Infantry at Camp Doniphan. At a recent meeting of the company's directors Clyde Taylor, acting president, asked permission to resume his work as counsel for the company as soon as President Kealy could return.

O. R. Sturzinger, formerly superintendent of the Northwestern Ohio Railway & Power Company, Toledo, Ohio, has been appointed general manager of the Lakeside & Marblehead Railroad, to succeed A. B. Mack. Mr. Sturzinger entered electric railway work during the construction of the Sandusky, Milan & Norwalk Electric Railway. Later he was made assistant

general manager of the company. When that property was included in the system of the Lake Shore Electric Railway Mr. Sturzinger became assistant to the superintendent of motive power. In 1903 he entered the service of the Toledo, Port Clinton & Lakeside Railroad. Four years later he was made general superintendent of the company and later superintendent of the Northwestern Ohio Railway & Power Company, the successor.

Thomas F. Mullaney, chief engineer of the Third Avenue Railway, New York, N. Y., since 1907, has resigned from that company and will take a short vacation before making any plans for future work. Mr. Mullaney is one of the pioneers of the electric railway industry and has been actively connected with it since 1888, when he joined the Thomson-Houston Electric Company, Lynn, Mass. He began his engineering career as a machinist, and while so engaged installed, in Lynn, Mass., what was probably the first line



T. F. MULLANEY

of shafting with friction clutches for the driving of dynamos in an industrial plant. This experience brought him in touch with electrical developments and he decided to engage in the new industry. He remained with the Thomson-Houston Electric Company and its successor, the General Electric Company, for the next twenty years, or until 1907, and during this time had charge of the installation of a great many of the first electric railways in this country. Among them was the Lenox Avenue line in New York, the first underground conduit system in that city, and also the Union Railway in Bronx Borough, the first road in New York to be equipped with the overhead trolley. In May, 1907, he accepted the offer of the late F. W. Whitridge, then receiver of the Third Avenue Railway, to become chief engineer of that company. Mr. Mullaney has presented several papers on topics connected with railway operation before engineering organizations.

Samuel E. Smith, who has been superintendent of railways of the Reading Transit & Light Company, Reading, Pa., was made general manager of

railways of the company on Jan. 1. Mr. Smith was born at Womelsdorf, Pa., in 1877. He entered business as a cash boy in a department store in Reading. He next became connected with the dispatching and storehouse departments of the Philadelphia & Reading Railroad. He left railroad work to enter the service of the Holophane Glass Company in New York. About a year later he joined the forces of the Atlantic Refining Company. His next position was with the Monticello Company at Reading and Trenton, dealers in brick. His connection with the Reading Transit & Light Company followed six years later. His first work for the company was as purchasing agent. Subsequently he became claim agent of the company. With the change in control of the railway and light properties at Reading Mr. Smith was made superintendent of railways.

Obituary

Thomas T. Robinson, vice-president and general manager of the Dayton, Covington & Piqua Railway, died at his home in West Milton, Ohio, on Dec. 15. Mr. Robinson has been in charge of this property since it was built and owned the controlling interest in it.

W. I. James, traveling auditor of the Detroit (Mich.) United Lines, died on Jan. 3 while in Redford. Mr. James had been in the employ of the company for eleven years. He began as agent at Orion, Mich., and was steadily advanced until in February, 1916, he was made traveling auditor. Mr. James is survived by his widow and one child.

Joseph S. Baecher, who was formerly secretary and treasurer of the Buffalo (N. Y.) Street Railway, now part of the International Railway, died on Jan. 2 after a short illness. Mr. Baecher became connected with the company in 1868, and continued with it for more than thirty years, occupying various positions until he became secretary and treasurer. He resigned in 1900. He then became secretary and treasurer of the Bell Telephone Company, and held that position until six years ago, when the company was merged in the New York Telephone Company.

George R. Tripp, who was connected with the Boston (Mass.) Elevated Railway for more than forty years, died at his home in Arlington, Mass., on Jan. 7. For eleven years Mr. Tripp was superintendent of surface transportation of the company. He was born in Kennebunk, Me., in 1858. He entered the employ of the railway when he was twenty-two years old. He served successively as conductor, starter, superintendent of the carhouse, purchasing agent, superintendent of the South Boston division, superintendent of the Charleston division, and then as superintendent of surface transportation of the company.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Recent Incorporation

*Home Electric Company, Hendersonville, N. C.—Incorporated to construct and operate interurban railways. Capital stock, \$50,000. Incorporators: Anne Oates, William H. Oates and Claudia H. Oates, all of Hendersonville.

Franchises

Auburn, Wash.—An ordinance has passed its first reading granting the Chicago, Milwaukee & St. Paul Railway a franchise to erect, maintain and operate poles and wires for the electrification of its line within the city limits.

Seattle, Wash.—The Puget Sound Traction, Light & Power Company has applied to the City Council for a franchise across the Ballard Bridge at Fifteenth Avenue, N.W. The application has been referred to the city utilities and franchise committees. That the Ballard Bridge is to figure in a settlement of all differences between the city of Seattle and the Puget Sound Traction, Light & Power Company was indicated at a recent meeting of the city utilities committee, when these Councilmen voted to recommend to the franchise committee that no new franchise be granted to the company until all provisions of present franchise were complied with.

Track and Roadway

Visalia Electric Railroad, Exeter, Cal.—A report from the Visalia Electric Railroad states that its extension of the line from Exeter to Strathmore, 20.9 miles, will be placed in operation this year, and that gas-electric power will be used.

Pacific Electric Railway, Los Angeles, Cal.—Three applications have been filed by the Pacific Electric Railway with the Railroad Commission of California for authority to build tracks across streets in Los Angeles as follows: A third railroad track at grade across Montana Street, Scott Avenue, Berkeley Avenue and Alvarado Street; a turn-out in Sixteenth Street, which will be an extension of the present turn-out in the south half of that street just west of Arlington Street; an additional track at grade across East Eighth Street, East Ninth Street and a portion of Long Beach Avenue.

Municipal Railway, San Francisco, Cal.—A trial run was made on the Twin Peaks Tunnel line of the Municipal Railway on Dec. 31. The line is approximately 3 miles long. It was announced that regular service through the tunnel would begin about Jan. 15, with cars running to Sloat Boulevard and Junipero Serro Boulevard. As soon as arrangements with the United Railroads are completed, service will be provided on Ocean Avenue and to the beach. The company reports that its Market Street extension from Van Ness to Kearny will be opened about May 1.

Des Moines (Ia.) City Railway.—The City Council has granted to the Des Moines City Railway an extension of one year in which to complete the construction work provided for in the franchise which was voted the company three years ago. The company has plans made for sixty-four blocks of construction work during 1918 and expects to complete the work if able to secure labor.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—This company is installing two blocks of automatic signals, one at Shipley and the other at Ardmore, Md. The material is furnished by the Union Switch & Signal Company, Swissvale, Pa.

Kansas City, Mo.—The Boards of Public Works has rejected bids for the construction of the Twenty-third Street viaduct from a connection with the east end of the Kansas Avenue bridge across West Bottoms to and connecting with the west line of New Brook Street at the intersection of Twenty-third Street. New bids are invited. The plans call for two approaches, one from Wyoming Street and the other from Frisco Yards, all of reinforced concrete and steel and main viaduct 1726 ft. long, with sidewalk, roadway and separate space for double street car tracks.

Manhattan & Queens Traction Corporation, New York, N. Y.—The transit committee of the Queens Chamber of Commerce has taken up with the Manhattan & Queens Traction Corporation the suggestion of Borough President Connolly that its trolley line be extended into the Ridgewood section of the borough in order to give that territory better means of transit communication with other parts of the borough. A trip of inspection was recently made to study the condition of the streets and the present residential and industrial developments along the proposed route. The officials of the Manhattan & Queens Traction Corporation have agreed to give immediate consideration to this proposed line.

Sand Springs (Okla.) Railroad.—Announcement has been made by the Sand Springs Railroad that it will not build the line from Tulsa to Pawhuska,

projected more than a year ago. It had been announced that work on this line would begin soon. The reason assigned for not going ahead with construction is that the Sand Spring Railroad is included in the lines now under government control, it being recognized both as a steam and electric railway.

Union Railway, Tulsa, Okla.—The Union Railway, which is building an interurban electric railway between Tulsa and Sapulpa, announces that the line will probably be completed and cars in operation by Feb. 1.

Chops and Buildings

Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala.—A new carhouse 44 ft. x 167 ft. and an engine room, 60 ft. x 95 ft., is being built by the Tuscaloosa Railway & Utilities Company.

Illinois Traction System, Peoria, Ill.—The carhouse and repair shops of the Illinois Traction System were partly destroyed by fire recently, the loss being about \$35,000.

Kansas City, Mo.—The Upper House of the Common Council has passed over the Mayor's veto, the ordinance previously passed by the Lower House, granting permission to the Interurban Central Station Company, Kansas City, to build a union passenger terminal station at Tenth and McGee Streets. The structure will be 208 x 132 ft., six stories, the construction to permit of the erection of four additional stories. The site and building will cost about \$2,000,000.

Texas Electric Railway, Dallas, Tex.—The Texas Electric Railway, the consolidated Strickland lines, has announced that it will soon begin erection of a large passenger station in Waxahachie. Two lots have been purchased as a site for the depot and for terminal tracks.

Power Houses and Substations

Fort Smith Light & Traction Company, Fort Smith, Ark.—This company reports that it is now installing one 3000-kw. two-phase, 2300-volt Parsons horizontal turbine and two 600-hp. B. & W. boilers in addition to its previous equipment.

Georgia Railway & Power Company, Atlanta, Ga.—A report from the Georgia Railway & Power Company states that it contemplates completing its Tullulah Falls power station by November, 1918, by installing one 12,000-kw. G.E. generator, driven by an 18,000-hp. Smith water turbine.

Northern Illinois Light & Traction Company, Ottawa, Ill.—It is reported that extensive improvements are to be made in the Marseilles plant of the Northern Illinois Light & Traction Company.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Why Purchasing Agents Are Not Buying Equipment

Financial and Natural Conditions Difficult to Overcome—Still Optimistic for the Future

Perhaps it is too early to say just what, if any, benefits have accrued to shippers and consignees from "Freight Moving Week," just closing. The unprecedented snowstorms in the Middle West, the disastrous effects of which have seriously interfered with the clearing up of the freight congestion, was an unexpected handicap. Some progress, evidently, was made, though the railway purchasing agents are pessimistically inclined regarding deliveries of equipment and track maintenance when the need is most pressing.

Buying on the part of the traction roads still remains at a low level. The disposition to reduce the essential purchases still further is recognized on all sides. The purchasing agent of one of the leading roads controlling and operating a number of important electric lines, in reviewing the situation for the *ELECTRIC RAILWAY JOURNAL*, stated that if the companies were in market for such cars or equipment as their usual requirements under ordinary conditions they would be unable to have their orders filled or shipments made on a guaranteed dating. He said no matter what one would like to get, and which is sometimes imperative to have, it would be so far behind in the delivery as to about nullify its usefulness.

Turbines and transformers are almost impossible to obtain, the agent added, especially if of special design and construction. Locomotives—whether steam or electric; cars—passenger, freight or trailers, and pretty nearly everything that could be enumerated in the railway accessory list, were all under foreign requisition. Therefore, car builders, manufacturers and sales agencies of supplies, etc., apparently are in no position to meet demands of any magnitude. Consequently equipment, rolling stock and track requirements are being closely guarded and used to the limit of endurance. The most serious drawback in domestic business is the uncertainty of shipments. Even such an item as time switches, a minor necessity, perhaps, declared the purchasing agent, is six months behind on delivery. The delays on essentials that absolutely control the operation of electric lines may be more easily imagined than described.

An engineer connected with a system of traction roads in various parts

of the country took the other side of the question. He maintained that the difficulty of renewing equipment, rolling stock, making extensions and desirable developments, was due entirely to lack of funds. The engineer said he did not advance this as a new proposition, as so many electric railway companies had and are yet making every effort to gain permission from the state authorities or public service commissions to raise rates. A few had been successful in their contention, namely, that a very much curtailed income interfered seriously with the proper maintenance of the properties at their fullest efficiency and greatest safety.

Securities of the traction roads were not marketable, unless at a disadvantage, just now, argued the engineer. He believed the government would eventually be obliged to follow the example of Great Britain and appoint a special branch of the war board to pass upon and indorse with its approval securities that could be negotiated without interfering with or antagonizing the sale of the national bond issues. The government is now utilizing about all of the investment money in the country, he contended, and to go out and attempt to sell railway issues now is little short of folly. The public is giving freely of its means for the great war loans, and the floating of any kind of certificate for the purpose of raising funds to keep public utilities in effective condition is not regarded favorably either in official or private financial circles. It conflicts with the overshadowing purpose before the whole country.

In England the sale of any securities, other than government bonds or securities, not having an official indorsement is illegal. So it should be here, continued the engineer, who further stated that, in his opinion, some such step will be taken. Public utilities must be kept up, consequently were essential to the community. Their maintenance, however, required money, the lack of which is being realized by traction roads everywhere. If the government will approve their securities the issues can be sold readily and the necessary capital raised to finance the acquirement of needed rolling stock and other improvements.

Worthington Company Elects President

C. P. Coleman was elected president of the Worthington Pump & Machinery Corporation, New York, N. Y., at a recent meeting of the board of directors.

Observation of Government Metal Prices

Eastern Dealers in Scrap Pledge Not to Deal in Above Standard and to Report Any Violation

At the present time when scrap metal is much more valuable than ever before electric railway managers and purchasing agents will be interested in the following resolution adopted by the Eastern division of the American Board of Scrap Iron Dealers at its meeting in Philadelphia on Jan. 11:

Resolved, That the members of the Eastern division of the American Board of Scrap Iron Dealers pledge themselves that they will neither buy nor sell any scrap iron or steel either by direct transaction or by the use of any subterfuge at a price in excess of that fixed by the government through the committee on steel and steel products of the American Iron and Steel Institute.

It is further resolved that each and every member of this division pledge himself to report promptly to an officer of this division any violation of the price agreement on the part of any one member, or non-member, mill or consumer who is a party to such violation.

No Change in Railroad Purchasing

Financial Condition of Roads Not to Curtail Orders—Deliveries Likely to Become Large

In answer to the question regarding the method to be followed in railroad purchasing now that the roads are under government control it has been reported from Washington that Director General of Railroads McAdoo will permit the various roads and systems to purchase cars, locomotives, rails, etc., as formerly.

One point is made which is without significance, namely, that the present financial condition of the roads need not deter them from placing orders. Furthermore, it is stated, car builders will have sufficient steel available to take care of the orders as placed. In this way freight car builders who for some time have been working at about 25 per cent of capacity will be able, provided of course the labor can be had, to greatly increase the output of freight cars.

Already a few of the roads are in the market for additional rolling stock and for rails.

The effect of this upon electric railway properties, unless taken over by the government, is obvious. Deliveries are very poor on many products already

Standardizing on Supplies

Situation in Supply and Demand Causes Manufacturers to Specialize in Certain Types and Sizes

At various times efforts toward standardization of electric railway supplies have received more than usual attention. To-day without any special effort on the part of the traction companies standardization is becoming more and more apparent.

Prevalent conditions of supply and demand have generally brought about this situation in a practical manner. Not that the electric railway purchases have been so heavy, but general buying has been good. A large number of products used by railways are not peculiar to that field. Manufacturers engaged in the production of these items are unusually busy.

In many instances where formerly a considerable stock of many different sizes and types was kept on hand, goods are now being delivered from production. In order, therefore, to hasten manufacture it has become necessary to standardize on a few sizes and types. In this way many items have for the time being been practically discarded. Of course, other sizes and types can in most instances be had, but then only at a sacrifice in delivery and at a higher price.

In addition there is a movement on foot to reduce fuel consumption through the curtailment of special equipment orders.

It is well known that electric railways have in the past bought largely of special equipment. To a certain extent, therefore, it has been necessary to buy special-maintenance equipment.

At this time, however, the purchasing agent has the opportunity to confer with the engineering department with

(Concluded from page 162)

and while traction companies are not buying very much it becomes more evident each day that future requirements must be anticipated earlier than ever.

Car wheels, rails, spikes and other road supplies, bridge materials and freight cars will undoubtedly be in greater demand by the steam roads, and while there is not the likelihood that prices will greatly increase it does seem almost certain that deliveries will be longer.

the aim of minimizing special equipment requirements.

By such action it is evident that stocks on hand can be reduced with the consequent investment saving to the property. With a less varied stock to be maintained it is equally evident that less labor and effort will be involved.

While at the present time standardization has largely been the result of circumstances that could not be altered, it is generally considered as a purely temporary measure. The longer this situation continues, however, the more the utilities will become used to purchasing the standard sizes and types only. For that reason the standardization of many products is now going on that under normal conditions could be accomplished only after a long time spent in discussion.

Ford, Bacon & Davis Incorporated

Ford, Bacon & Davis, engineers, announce the formation of the Ford, Bacon & Davis Corporation, organized for the purpose of conducting a general contracting business, with particular reference to industrial, public utility and power plants, steam and street railroads, docks, steamship and railway terminal facilities, subways, tunnels, hydroelectric and irrigation projects. In effect this means the continuance in corporate form of construction work which heretofore has been handled by the firm direct.

The corporation's organization comprises men skilled and experienced in engineering and contracting work by the most modern and economical methods. It is provided with ample capital to insure the successful completion of any work which it may undertake, and starts business with important work already entrusted to it. Its headquarters are at 115 Broadway, New York, with offices at New Orleans and San Francisco.

The facilities available to the new corporation from the firm of Ford, Bacon & Davis, now in its twenty-fourth year, which continues as heretofore, assure a continuance of this firm's standard of both engineering and construction efficiency and enable both design and construction to be carried on with a degree of co-ordination which should make for economy.

Prices Thought to Be at Peak

The Government's Action in the Matter of Price Fixing Is the Controlling Factor

While a few spasmodic increases in price are surely to be expected during the coming year, all present signs point to lower prices generally at the opening of 1919 than were in force at the opening of the current year. The action of the government in the matter of price fixing is held as the controlling factor.

The government price of 23½ cents for copper is undoubtedly being reflected in the readjustment of copper wire prices now taking place. In the past few months wire base has dropped from 36 to 30 cents and there are no indications that lower levels may not be reached. In fact, certain producers are already quoting lower.

At the same time brass is following the wire market. The government price did not immediately cause the brass price to break any more than it did wire base. As higher price stock, however, was used up and lower-priced material purchased prices were readjusted. Finished brass products have not yet responded to this situation in any noticeable degree.

In iron and steel the government has continued the prices now in effect until March 31, when a further readjustment may take place. In other commodities it has been expected the government may establish standard prices.

The natural result, of course, is to reduce the tendency toward higher prices, for there is no doubt but that in certain instances higher prices were quoted with no other justification than that they could be obtained.

The trade generally, therefore, is of the opinion that prices are now at a peak. Copper wire, which in normal times is considered to be a good market barometer for prices, is still expected to stick to its reputation to a certain degree.

New Service Station for Wagner Company

Wagner Electric Manufacturing Company, St. Louis, Mo., announces the opening of a service station in Seattle, Wash., to take care of service in the State of Washington and the Northwest.

RAILWAY MATERIALS PRICES

	Jan. 9	Jan. 16
Rubber-covered wire base, New York, cents per lb.	30	30
Wire, weatherproof (100 lb. lots), cents per lb.		
New York	34½-35¼	28¼-34¼
Chicago	38-38.35	33½-38.35
Rails, heavy, Bessemer, Pittsburgh	\$38.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$40.00	\$57.50
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.22	\$2.22
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.63	\$2.63
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.29	\$1.29
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.30	\$1.20
White lead (100 lb. keg), New York, cents per gal.	10	10
Turpentine (bbl. lots), New York, cents per gal.	48	48½

NEW YORK METAL MARKET PRICES

	Jan. 9	Jan. 16
Copper, ingot, cents per lb.	23½	23½
Electrolytic, cents per lb.	23½	23½
Lead, cents per lb.	6½	7
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7.87½	8
Tin, Straits, cents per lb.	85.00	85.00
Aluminum, 98 to 99 per cent, cents per lb.	36	35-37

OLD METAL PRICES—NEW YORK

	Jan. 9	Jan. 16
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19½	19½
Red brass, cents per lb.	17½	17½
Yellow brass, cents per lb.	14½	13½
Lead, heavy, cents per lb.	5½	5½
Zinc, cents per lb.	5½	5½
Steel car axles, Chicago, per net ton	\$43.42	\$42.42
Old carwheels, Chicago, per gross ton	\$35.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$33.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.50	\$17.50

Rolling Stock

Tidewater Southern Railway Company, Stockton, Cal., is having constructed at its shops an all-steel gasoline motor car for service between Stockton and Modest. It is expected to be ready Jan. 20. The car will carry forty-four seated passengers. There is a ladies' compartment and a smoker in opposite ends of the car in addition to the main body of the car. It will weigh ten tons when fully equipped, is capable of making a speed of fifty miles an hour with a 90 hp. engine. The total cost is about \$7,000. If successful this type of car will displace the old equipment.

Trade Notes

Meyer Safety Guard Company, Omaha, Neb., has removed its offices to 314 Brown Block.

John D. Stout has been appointed Chicago representative for the Terry Steam Turbine Company, Hartford, Conn. Mr. Stout was formerly assistant engineer of the Terry company, and was recently transferred from the New York office, where he was assistant manager.

American Car & Foundry Company, St. Louis, Mo., on Jan. 2 removed its purchasing and auditing departments to New York, where the main offices are located. About 100 employees of the two departments, with the office records and furniture, went east on a special train.

P. C. Gunion has just been made advertising manager of the industrial bearings division of the Hyatt Roller Bearing Company, Newark, N. J. He has been in the sales department of the Hyatt Company for two years. Previous to his recent appointment he was manager of the Pittsburgh office.

Holden & White, Inc., Chicago, Ill., has received from the Philadelphia (Pa.) Rapid Transit Company the largest order for brake slack adjusters ever recorded. This order is for 4298 Anderson slack adjusters, a complete equipment for all double-truck cars operated by the Philadelphia company. These adjusters are being shipped at present to Philadelphia, and are being installed as rapidly as possible.

Hess Bright Company, Philadelphia, Pa., has closed its retail office at 934 North Broad Street, owing to the enlistment of Rush S. Whiteside, the local manager, and G. L. Jenks, his assistant, in the aviation section of the United States Army. The Ahlberg Bearing Company of Chicago will open a branch house at the same address, and will represent the Hess Bright Company as local distributors for the retail trade.

George S. Thompson, representative in Paris, France, of the Vulcan Steel Products Company, New York, N. Y.,

was recently appointed to the purchasing board of the American Expeditionary Forces in France. Mr. Thompson has been assigned particularly to the handling of steel matters. This board is composed of American civilians living in France, and its duties consist of passing upon all purchases made in Europe by the American army.

L. E. Van Norman, chief of the division of information, Washington, D. C., has compiled a war trade manual for shippers. Since some of the data in the "Rules and Regulations of the War Trade Board," which has been distributed very widely throughout the country, have now been superseded by new rulings and lists, the division of information of the board is preparing a "War Trade Board Manual for Shippers," which will contain only data in force at the time of its publication. Copies may be had by writing.

Thordarson Electric Manufacturing Company, Chicago, Ill., has recently undergone a reorganization in all departments. A. S. Lindstrom is now general manager, A. Johnson is the new sales manager, C. B. Olson is purchasing agent and C. R. Oschgar is production manager. The company has also appointed Mr. Alumbough as central Western representative and Mr. Gibson as Eastern representative. W. I. Otis and the Western Engineering Sales Company continue to represent the Thordarson company on the Pacific Coast.

Milton Rupert was recently elected vice-president and assistant treasurer of the R. D. Nuttall Company of Pittsburgh, Pa., manufacturer of gears, pinions and trolleys. Mr. Rupert has been with the Nuttall Company since March 4, 1893, holding various positions. In 1903 he was appointed head of the general offices, being directly in touch with all office matters and also manufacturing operations. During the latter part of this period Mr. Rupert was assistant to the president and general manager. In his new position Mr. Rupert will have charge of sales and manufacturing activities.

Hale & Kilburn Company, New York, N. Y., is making arrangements to reorganize on a plan submitted by the committee having it in charge. They have agreed on the major terms, and Jan. 16 was settled upon as the last day when stock may be deposited under the agreement. It is proposed to form a new company with \$4,000,000 preferred stock, which will be exchanged for the old preferred on the basis of \$66 2/3 new for each \$100 of old stock. Present common stock owners will have the privilege of exchanging their shares for new common on the basis of \$25 new for \$100 old common. The plan calls for the sale of \$1,000,000 6 per cent serial gold notes, the first lot of \$100,000 maturing July 1, 1922. The notes are to be offered for subscription by stockholders at 95, with a bonus of new common stock equal at par with the principal of the notes. It is proposed to trustee all the new stock for five years.

Chicago Fuse Manufacturing Company, Chicago, Ill., announces that it has purchased the entire renewable-fuse business of the Multi Refillable Fuse Company, makers of the well-known line of multi-refillable fuses. This transaction includes the conveyance of all merchandise, materials, machinery, tools, designs, patents, good will and unfilled orders, and hereafter these fuses will be manufactured and marketed solely by the Chicago Fuse Manufacturing Company under its trade name "Union." The Chicago Fuse Manufacturing Company will still continue with its line of non-refillable fuses, thereby being in a position to furnish either type of fuse as desired by the trade.

New Advertising Literature

Manistee Iron Works, Manistee, Mich.: Bulletin No. 53 is descriptive of its single-stage centrifugal pumps.

Walter A. Zelnicker Supply Company, St. Louis, Mo.: Bulletin No. 230 lists and briefly describes various articles, machines, etc., in which it specializes. Copies may be had by writing.

War Trade Board, Washington, D. C.: Is ready to distribute bulletin No. 1, entitled "Trading with the Enemy." The pamphlet includes the full text of the Act of Congress prohibiting American manufacturers and merchants, under penalties, from "trading with the enemy, or ally of enemy, without first obtaining a license from the War Trade Board." Besides notes on the enemy trading list a complete index of the names by countries is also supplied.

Carnegie Steel Company, Pittsburgh, Pa.: In the form of a letter from a retired steel man to a friend, which is embodied in an illustrated pamphlet entitled "My Dear Jim," the Carnegie Steel Company of Pittsburgh, Pa., has printed a description, in non-technical language, of its chief products. Not only is the vast plant's long list of products dealt with in an interesting manner by the writer of this admirable compilation, but the personnel and development of the great business is also touched upon in the same easy-going style. Copies may be had on application.

Merchants' Association, New York, N. Y.: A valuable summary of the readjustments made by English manufacturers on account of the war, as explained in the conferences between American manufacturers and a commission sent to this country by the British Ministry of Munitions. No publicity as to what took place at these conferences, which in this city were held at the headquarters of the Merchants' Association, was permitted until after the British commission had concluded its work. The discussions at the conferences are of great interest and importance to all American manufacturers, whether they are engaged in the production of war material or not.



In Ice and Snow

New York's "red" cars—on the Third Avenue and Broadway lines—have to contend with conditions of traffic which demand a brake equipment that is absolutely dependable.

There are 1978 Peacock Brakes on the Third Avenue system:

For 160 storage battery cars, the Peacock Type G.

For 50 low-level cars and 25 semi-convertible cars, the Peacock Staffless.

For 75 closed cars, the Peacock Improved Type.

For 125 open cars, the Peacock Type AA.

For 629 convertible cars, the Peacock Type E27.

Peacock Brakes Spell S-A-F-E-T-Y for **Every Car**.

The Eccentric
Drum



National Brake Co.

Buffalo, N. Y.

Bankers and Engineers

Electric Railway, Lighting and Power Company Bonds

ENTIRE ISSUES PURCHASED

THE NATIONAL CITY CO.

NATIONAL CITY BANK BUILDING N. Y.
Correspondent Offices in Twenty-three Cities

THE J. G. WHITE COMPANIES

ENGINEERS
FINANCIERS



CONTRACTORS
OPERATORS

43 EXCHANGE PLACE NEW YORK
LONDON CHICAGO



STONE & WEBSTER

Industrial Plants and Buildings, Steam Power Stations,
Water Power Developments, Substations, Gas Plants,
Transmission Lines, Electric and Steam Railroad Work.
NEW YORK BOSTON CHICAGO

Arthur D. Little, Inc.

Our chemical control of electric properties provides not only tests of fuel, lubricants, water, wire, bearing materials, etc., but also specifications for purchases, as well as constant research for betterment and economy in supplies and in operation. Successful experience in this work for many years warrants us in inviting correspondence and bidding visitors welcome to acquaint themselves with our methods of service.

93 Broad Street, Boston, Mass.

SANDERSON & PORTER ENGINEERS

REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT AND POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

WOODMANSEE & DAVIDSON ENGINEERING CO.

ENGINEERS

MILWAUKEE
First National
Bank Bldg.

CHICAGO
784 Continental & Commercial
National Bank Bldg.

THE ARNOLD COMPANY

ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL

105 SOUTH LA SALLE STREET
CHICAGO
111 BROADWAY
NEW YORK

H. M. Byllesby & Company, Inc.

NEW YORK
Trinity Bldg.

CHICAGO
No. 208 So. La Salle St.

TACOMA
Washington

Purchase, Finance, Construct and Operate Electric Light,
Gas, Street Railway and Water Power Properties.

Examination and reports. Utility Securities Bought and Sold.

ALBERT S. RICHEY

ELECTRIC RAILWAY ENGINEER

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

Robert W. Hunt Jno. J. Cone Jas. C. Hallsted D. W. McNaugher

ROBERT W. HUNT & CO., Engineers

BUREAU OF INSPECTION TESTS & CONSULTATION
Inspection and Test of all Electrical Equipment

NEW YORK, 90 West St. ST. LOUIS, Syndicate Trust Bldg.
CHICAGO, 2200 Insurance Exchange,
PITTSBURGH, Monongahela Bk. Bldg.

JOHN A. BEELER

OPERATING AND RATE INVESTIGATIONS
TRAFFIC SURVEYS AND SCHEDULES

52. ELECTRIC RAILWAY MANAGEMENT 2
VANDERBILT SUPERVISION OF CONSTRUCTION COMMONWEALTH
AVE. ENGINEERING AVE.
NEW YORK APPRAISALS BOSTON

JAMES T. SWAN CERTIFIED PUBLIC ACCOUNTANT

60 STATE ST., BOSTON

SPECIALIST IN TRANSPORTATION STATISTICS
AND RATE INVESTIGATIONS

D. C. & WM. B. JACKSON ENGINEERS

CHICAGO BOSTON
HARRIS TRUST BLDG. 248 BOYLSTON ST.

Plans, Specifications, Supervision of Construction
General Superintendence and Management
Examinations and Reports
Financial Investigations and Rate Adjustments

Ford, Bacon & Davis, Engineers.

115 BROADWAY

New Orleans NEW YORK San Francisco

Sloan, Huddle, Feustel & Freeman Consulting Engineers

Analytical Studies of financial and operating conditions,
appraisals and rate adjustments of electric railway and
all public utility properties.

BOSTON, 14 Kilby Street CHICAGO, Conway Bldg.

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
Mechanical Testing.

80th Street and East End Ave., New York, N. Y.

Scofield Engineering Co. Consulting Engineers

PHILADELPHIA, PA.
POWER STATIONS
HYDRAULIC DEVELOPMENTS
GAS WORKS
ELECTRIC RAILWAYS



Art Work and Engraving

Collier Service *Secures Patrons for Car Advertising*

If you read car advertisements—and who doesn't?—you must have noticed the number of representative national advertisers.

The purchasers of this advertising service did not beg for admission to the street car racks. They had to be *shown* that street car advertising is profitable.

They were not interested in the car card space alone—they were interested in the message Collier Service could put there.

A visit to the art department of Collier Service just to watch an artist produce an effective card is an eye-opener showing how this organization makes car card advertising an asset for its customers, and therefore an assured income to the Railway Company.

Barron G. Collier
INCORPORATED

Candler Building

220 West 42nd Street, New York City



Columbia Brake Lever Jaws



When you think of safe breaking, don't forget how much depends upon the brake-rigging; and that the brake-lever jaws constitute the most ticklish part of said brake-rigging.

As in the manufacture of other Columbia parts, we use the most modern methods and machinery. You can see for yourself the Bradley 200-lb. hammer that is forging a Columbia-made brake-lever jaw.

The following is but a *partial* list of Columbia products. We can make you most anything in wood or metal.



TOOLS

Armature and Axle Straighteners
 Armature shaft straighteners
 Armature buggies and stands
 Babbitting molds
 Banding and heading machines
 Car hoists
 Car Replacers
 Coil taping machines for armature leads
 Coil winding machines
 Pinion pullers
 Pit jacks
 Signal or target switches
 Tension stands

CAR EQUIPMENT

Armature and Axle Bearings
 Armature and field coils
 Bearings (Axle and Armature)
 Brush-holders and brush-holder springs
 Brake, door and other Handles
 Brake forgings, riggings, etc.
 Car trimmings
 Commutators
 Controller handles
 Forgings of all kinds
 Gear cases (steel or mall. iron)
 Grid resistors
 Third-rail shoe beams and accessories
 Trolley poles (steel) and wheels



Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

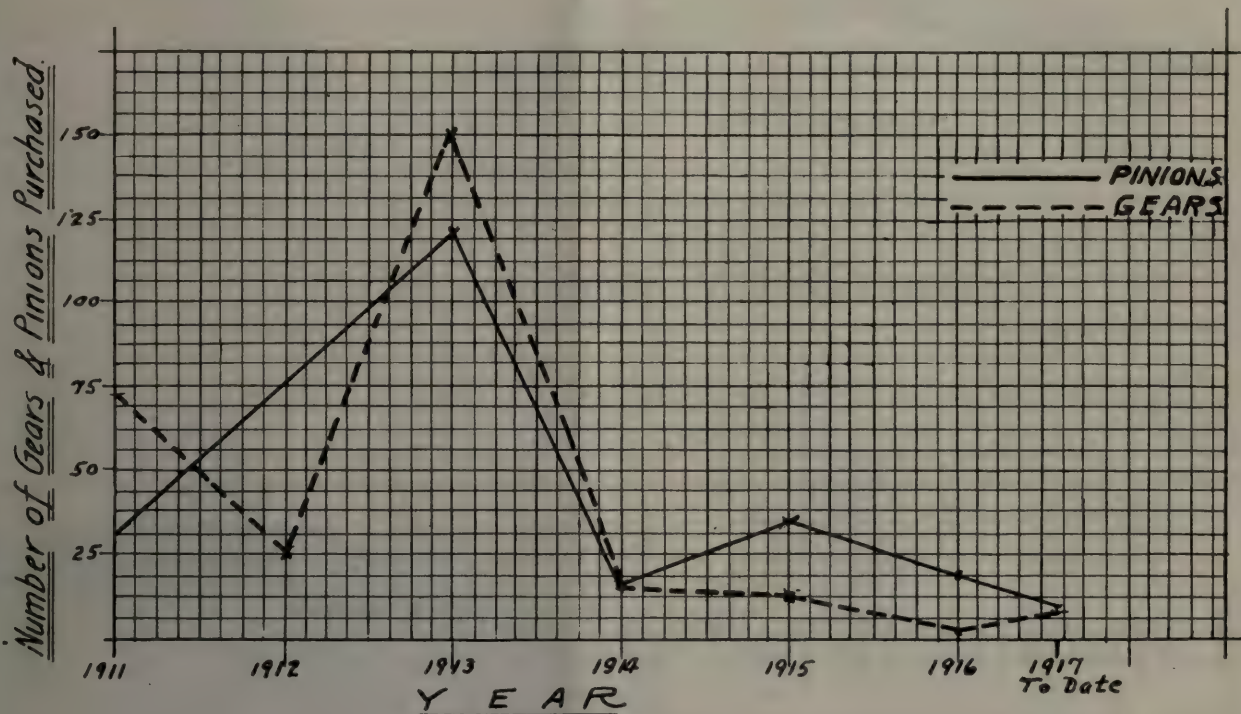
W. R. Kerschner Co., Inc., N. Y.

Holden & White, Inc., Chicago

F. F. Bodler, San Francisco



It's tough on the gear-maker BUT It's a continuous smile for the railroad



Aurora, Elgin & Chicago R. R. Company began to equip with Tool Steel gears and pinions in 1911 and were virtually equipped by the end of 1913. Their purchases, 1911 to 1913, indicate the rapidity with which the cheaper gears were wearing out and breaking. Purchases from 1914 on show what happens when Tool Steel becomes standard.

Wouldn't you like to eliminate your gear expenses after 1920? Buy Tool Steel Now.

THE TOOL STEEL GEAR AND PINION CO.
CINCINNATI

Get Repairs Off Your Mind

Hereafter Specify "*Anderson*"

The Anderson Trolley Wheel

Has the right resistance to wear to ensure long life, yet not enough to wear the wire rapidly. Mechanically designed for perfect balance and arcless operation at high speeds.



ANDERSON Trolley Wheel



ANDERSON
Cross-Over

The Anderson Cross-Over

Hammering at crossings is reduced by the careful arrangement of parts. Eliminates flaring arcs, wheel trouble, and repair wagon visits.

*Have you the
Anderson Catalogs?*

Albert & J. M. Anderson Mfg. Co.

289-293 A Street

(Established 1877)

Boston, Mass., U. S. A.



BRANCHES:
New York, 135 Broadway
Chicago, 105 So. Dearborn Street
Philadelphia, 429 Real Estate Trust Bldg.
London, E. C., 48 Milton St.



Lincoln Bonds
Are Not Only Inconspic-
uous, Because of
Oxidization
They Are Also Tenacious



WELDING BOND ON 80-LB. T-RAIL. BOND IN PLACE.
WORCESTER STREET RAILWAY

The tenacity with which Lincoln Bonds hug the rail is the result of a true weld—an intermingling of the copper of the bond into the steel of the rail.

In addition to giving ideal bonding permanence and conductivity, the Lincoln SYSTEM of bonding is also the most economical, since it uses energy with motor-generator efficiency and permits rapid work on *live track* with but one or two operators.

THE LINCOLN BONDING CO.

634 Huron Rd., Cleveland, Ohio

AGENTS:

LEWIS & ROTH COMPANY
1012 Liberty Bldg., Philadelphia, Pa.
519 W. 38th St., New York City, N. Y.
CHARLES N. WOOD CO.
14 Federal St., Boston, Mass.

HOLDEN & WHITE, Inc.
343 S. Dearborn St., Chicago
W. C. BURDICK, Milwaukee, Wis.
808 First National Bank Building
W. H. ELLIOT, Chattanooga, Tenn.

Rimco

Rubber
Insulated

Pliers

Each
Pair
Tested
to
10,000
Volts



"RIMCO"
RUBBER INSULATED
PLIER

This pair tested and passed for
10,000 volts by the Electrical
Testing Laboratories of New
York City.
Date of test *Jul. 16, 1917*

CAUTION

Always see that "RIMCO"
PLAINFIELD, N. J. is stamped
on the insulation of plier to
which this tag is attached.

GUARANTEE

We guarantee all "RIMCO"
Rubber Insulated Pliers, bear-
ing our name and serial number,
to be free from all imperfections
in material and workmanship.

RUBBER INSULATED

METALS CORPORATION
PLAINFIELD, N. J., U. S. A.

Serial No. 6- 5001

When tested pliers can be obtained at a price lower than ordinary pliers with detachable soft rubber sleeves, there can be no excuse for any high tension work being carried on with the inferior protection of old style equipment.

Rimco pliers are protected by a semi-soft insulation intimately bonded with the metal by the Elchemco patented process. They will not break or crack—the insulation cannot be separated from the metal by any mechanical or electrical means. Ask for prices on single pliers and quantity orders.



The Rubber Insulated Metals Corporation

(Sole owners of the Elchemco Process for
binding rubber to metals, protected by
American and Foreign Patents.)

Plainfield, N. J.

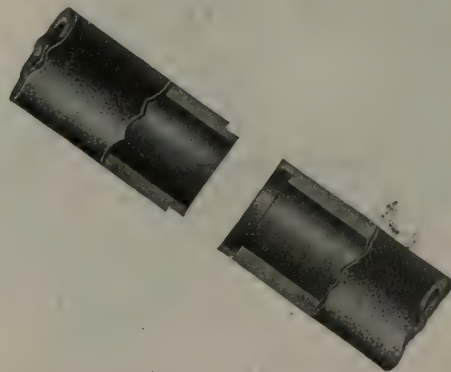
SALES AGENTS

Electric Service Supplies Co.,
17th and Cambria Sts., Phil-
adelphia, Pa.

National Railway Appliance
Co., 50 East 42nd St., New
York City.

Johns-Manville

FIBRE CONDUIT



Johns-Manville Fibre Conduit Prevents Electrolysis by Preventing Leakage

WHERE speedy installation is a factor, everything is in favor of Johns-Manville Fibre Conduit. Unskilled labor can do all the work. No burlap or special cement is required at the joints. One man can keep the duct-layer supplied, and breakage due to rough handling is practically negligible.

When completed, the duct is a smooth watertight tube. Rough walls and cement drippings—the cause of about 90% of all cable trouble—are eliminated. Unaffected by severe sub-soil conditions, and possessing exceptionally dielectric and mechanical strength, Johns-Manville Fibre Conduit meets every service requirement of installation and maintenance economy. Ask for a copy of the construction data booklet.



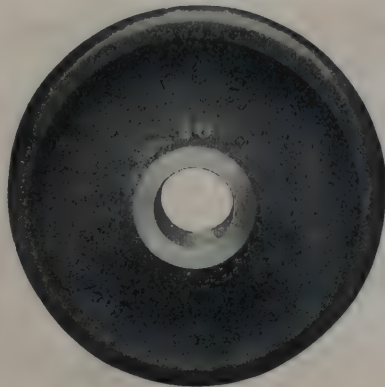
Serves More People in More Ways Than Any
Other Institution of Its Kind in the World

H. W. JOHNS-MANVILLE CO.
NEW YORK CITY

10 Factories—Branches in 61 Large Cities

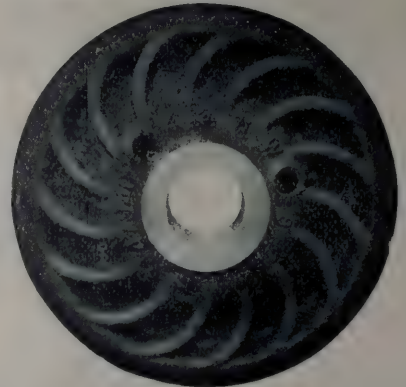
USE GRIFFIN F. C. S. WHEELS

and secure a maximum mileage at a minimum cost



Their guarantee assures you of a definite cost per 1,000 miles.

An additional reduction in cost is secured by the use of a pit car wheel grinder, which in twenty to forty minutes grinds the wheels truly cylindrical, eliminating service defects, and making a new wearing surface of the proper taper.



A pit car wheel grinder eliminates the cost of removing wheels from the trucks, and reapplying.

Brake shoe renewals, and consequent costs, are twenty to twenty-five per cent lower where chilled iron wheels are used than with other types of wheels.

GRIFFIN WHEEL COMPANY

McCormick Building, Chicago, Ill.

FOUNDRIES

Chicago

Detroit

Boston

Los Angeles

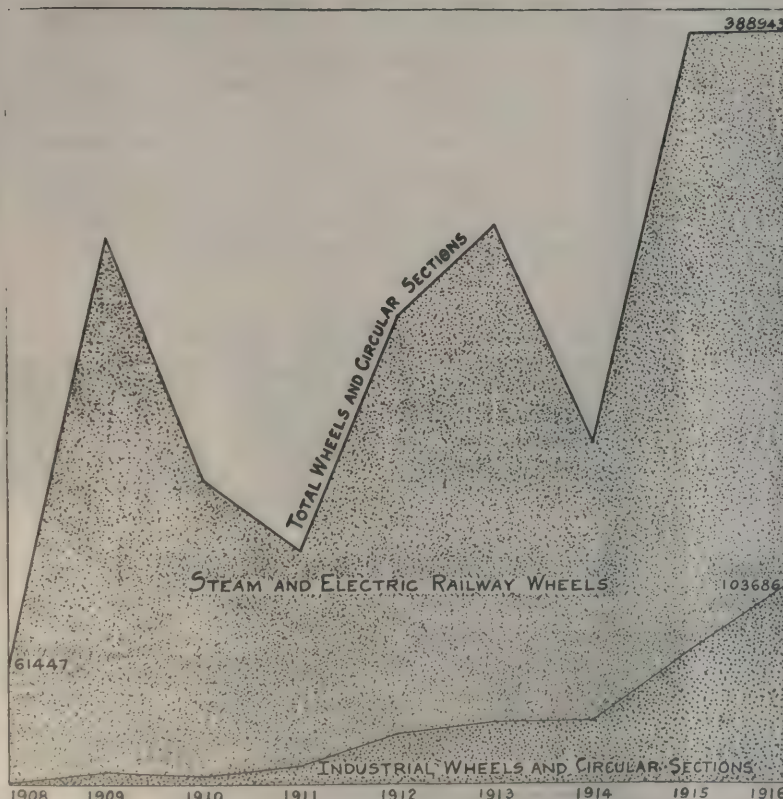
Denver

St. Paul

Tacoma

Kansas City

Steel for Service



That the Solid Rolled Steel Wheel has made its place in modern steam, electric and industrial railway service is graphically illustrated in the chart which shows, by years, rolled steel wheels made by this company.

The total contour line indicates that while in the main sales of solid steel wheels have followed and been affected by the peaks and valleys of the car buying movements, there has been a progressive increase in the number manufactured. The number of steam and electric railway wheels purchased in any year is somewhat commensurate with the number of cars purchased in that year.

So far as industrial wheels are concerned, the lower area shows a continuous increase, which in the last three years has been decidedly marked. The experimental stage has, therefore, been passed, and the solid steel wheel for industrial purposes may be considered as firmly established in the confidence of users.

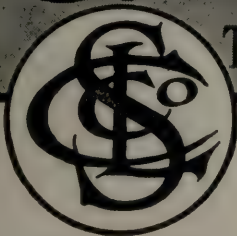
There is a reason: the merits of the solid steel wheel are many and are well worth careful consideration by the user. To furnish such information is a part of the service this company very gladly renders. It offers its technical skill to any user who desires to bring his equipment to the highest standard of efficiency based on ultimate economy in expenditure.

Carnegie Steel Company

General Offices: Pittsburgh, Pa.

"The Quality Shops"

CARS



TRUCKS

Labor

No factory or organization can maintain a truly high standard in its output unless its workmen are heart and soul with the management.

Shifting labor never yet produced the best that could be obtained from even the best-equipped plants.

It is one of our proud claims that a majority of our workmen consider their positions in our plant *permanent*—and their interest in the quality of their handiwork is an item of advantage to the purchaser.

If you have a problem of any kind pertaining to cars we will gladly co-operate in its solution.

St. Louis Car Company
St. Louis, Mo.

Service

You get more than simply **BRAKE SHOES** when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

All of which means increased efficiency and decreased cost of Brake Maintenance.

American Brake Shoe & Foundry Co.
30 Church St., New York
McCormick Bldg., Chicago Chattanooga, Tenn.

Staying Power



That's what you value most in a man or a bearing—and bearings differ in staying power just as men do. It all depends on the stuff they're made of.

MORE-JONES "TIGER" BRONZE AXLE AND ARMATURE BEARINGS

are the product of uniformly pure, sound materials developed by a special method of casting to a condition of exceptional strength and toughness. This means reliable service, a slow, even rate of wear—exceptional staying power.

We know this is true because of the records More-Jones Axle and Armature Bearings have made and are making to-day on many of the largest systems in this country and abroad.

Test them yourself. We're confident you'll make them standard after a trial.

*Further information and
prices on application.*

More-Jones Brass & Metal Co.
3134 No. Broadway, St. Louis, U. S. A.

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



STANDARD STEEL WORKS CO.

Morris Building, Philadelphia

New York
Chicago
St. Louis
Pittsburgh
San Francisco
Richmond

Portland
Havana, Cuba
London, Eng.
Melbourne, Aust.
Monterey, Mex.
Mexico City.



Notice to Subscribers

If YOUR copy does not reach you promptly, do not assume that it has been lost or that it was not mailed.

DELAYS are inevitable just now, in the unprecedented congestion of the mails due to the plight which war-time conditions have plunged the railroads.

PLEASE wait a day or so before you write to us —by that time your copy will probably be in your hands. Save that three cents! But if the delay continues, write us.

THE WAR is no respecter of persons—even Uncle Sam is not exempt from its inconveniences.

ELECTRIC RAILWAY JOURNAL.



For Your Service
 we have spent a third of a century in perfecting
STANDARD Electric Wires and Cables
 of all kinds and all sizes, also
 Cable Accessories. *Write for our prices before buying.*
Standard Underground Cable Co.
 Pittsburgh, Pa.
 New York, Philadelphia, Chicago,
 Boston, San Francisco, St. Louis.



ALUMINUM

Railway Feeders

And all kinds of **Electrical Conductors**

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information.

Aluminum Company of America
 Pittsburgh, Pa.



Makes Splices Easy to Open Up, Too

All you need is a wrench to open up a splice or make it up again, if you use

FRANKEL SOLDERLESS CONNECTORS

Wonderfully simple; Mechanically and electrically strong. Withstand big overloads. Get our booklet.

Factory:
177-179 Hudson
St., New York

MAKERS OF THE BEST ONLY

FRANKEL

CONNECTOR CO. INC. N.Y.

Sales Rooms:
1140-1146 Broadway
New York

Simplex Car and Track Jack

Templeton, Kenly & Co., Ltd.
 1020 So. Central Ave. Chicago, Ill.

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

THE P. EDW. WISCH SERVICE


Suite 1710
Park Row Bldg., New York

DETECTIVES

Suite 715
Board of Trade Bldg., Boston

STEEL POLES

For Every Pole Purpose



Bates Steel Poles Ornamenting the Approach to the New Wisconsin State Capitol Building, Madison, Wis.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.
Most artistic STEEL POLE in the world for any service.
 We make the lowest prices.
 We have constantly on hand about two thousand tons of steel and can make immediate shipments.
 A full line of convenient malleable fittings.
Our steel pole TREATISE tells a big story. Ask for it.

BATES EXPANDED STEEL TRUSS CO.
 208 South La Salle St., Chicago, Ill., U. S. A.

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.
 Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates
 Turnouts and Cross Connections
 Kerwin Portable Crossovers
 Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED



American Rail Bonds

**Crown
 United States
 Twin Terminal
 Soldered**

American Steel & Wire Company
 Chicago New York Cleveland Pittsburgh Worcester Denver

Export Representative: U. S. Steel Products Co., New York
 Pacific Coast Representative: U. S. Steel Products Co.
 San Francisco Los Angeles Portland Seattle

THE LINDSLEY BROTHERS CO.

Western "Good Poles Quick" Northern

Quick Shipments
from our
Minneapolis Yard

Rooms 832-834, 72 West Adams St., Chicago, Ill.
Spokane - St. Louis

Butt Treating
Open Tank and
"Hot and Cold" Processes

MARSH & MCLENNAN FIRE INSURANCE

Special Attention Given to Traction Insurance

Insurance Exchange, CHICAGO

19 Cedar St. NEW YORK 1615 California St. DENVER 314 Superior St. DULUTH 300 Nicollet Ave. MINNEAPOLIS Ford Bldg. DETROIT 17 St. John St. MONTREAL 23 Leadenhall LONDON

THESE OFFICES WILL GIVE YOU THE BEST THERE IS IN INSURANCE SERVICE

Michigan

Western

CEDAR POLES
POSTS, TIES AND PILING
BUTT TREATING

The Valentine-Clark Co.
General Office: Minneapolis, Minn.

Toledo, Ohio; Chicago, Ill.; Kansas City, Mo.; St. Maries, Idaho.

POLES

NORTHERN WHITE CEDAR WESTERN RED CEDAR
BUTT TREATING

PAGE & HILL CO.

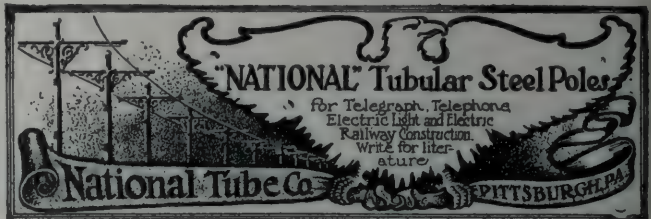
MINNEAPOLIS, MINN.

FEDERAL SIGNAL CO.

ALBANY, N. Y.

CONSULT OUR ENGINEERS ON YOUR
SIGNAL REQUIREMENTS

52 Vanderbilt Avenue, New York Monadnock Block, Chicago
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The Trenton

Three Section Tower Outfits to fit any make of chassis.

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J. R. McCARDELL & CO., Trenton, N. J.

POLES WESTERN CEDAR PILING

We brag about the SERVICE we give

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WM. MULLER & CO., 1729 McCormick Bldg., Chicago.
Commit us to memory.



Wire Rope
and Wire

Insulated
WIRES and
CABLES

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Aristos "COPPERWELD"—Copper Clad Steel Wire—

Beats Solid Copper 40 Ways

Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs Less to Maintain

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Made from the product of Copper Clad Steel Co. of Pittsburgh, Pa.
Western Sales Office PAGE STEEL & WIRE Eastern Sales Office
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Chapman Automatic Signals

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Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG.

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Engineers & Contractors

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Peirce Forged Steel Pins with Sheet Steel Thimbles

Your best insurance against insulator breakage

Hubbard & Company

PITTSBURGH, PA.

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Commutators, Trolley Wheels, Sleet Trolley Wheels,
Trolley Ears, Line Material, Controller Fingers, Brush
Holders, etc

We make quality goods.

THE EUREKA COMPANY, North East, Pa.

A Great Combination



No. 1 to sweep crossings.

No. 2 to handle light dirt and snow in the frogs, switches, and curves.

No. 3 to remove ice, slush and mud from the same places and a chisel point on the end of the handle to loosen the ice and crust.

No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

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1021 N. Delaware Ave., Philadelphia, Pa.

Abundant Strength



for every fill on the line—that's what you'll find in

"ACME"



(NESTABLE)

Corrugated Galvanized



CULVERTS

These Culverts are light, easy to handle, easy to place, but the

strength to stand up in service is there in abundance.

For shallow fills under light loads "ACME" are excellent—certainly, but they're just as practical for the deeper fills and heavier loads.

We'd like to tell you more about "ACME" Culverts, about their economy, ease of installation and lasting qualities. Write for Catalog M-3.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

HIGHEST QUALITY

TRACK SPECIAL WORK



WE MAKE THIS GRADE ONLY

CLEVELAND FROG & CROSSING CO.
CLEVELAND OHIO

SPECIAL TRACK WORK

Built to withstand severe service



SWITCHES
FROGS
CROSSINGS
and
COMPLETE
LAYOUTS

New York Switch & Crossing Co.
Hoboken, New Jersey



"WHALEBONE"

Fibre Track Insulation

DIAMOND STATE FIBRE CO.

Elamere, Del. Bridgeport, Penna. Chicago, Ill.

TOOLS

for all classes of electrical construction and repair work. Write for catalog.

Mathias Klein & Sons Canal Station 25 **Chicago**

Business not as usual

We have been hearing about
SHIPS—SHIPS—SHIPS
and More Ships

Now Think About It
We cannot get those Ships
without
THE RAILROADS

This War
cannot be won without
The Railroads

THE RAIL JOINT COMPANY

61 Broadway New York City

Send for Our New Booklet on the Subject of Water as Used for Steam Making

The subject is one that cannot be dealt with adequately in the limited space of an advertisement.

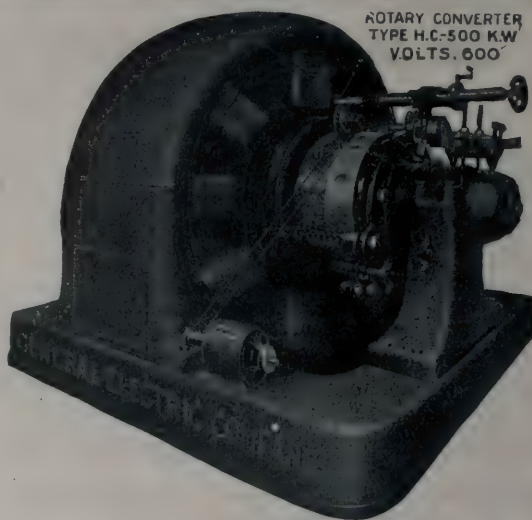
This booklet explains the causes of Corrosion, Incrustation, Foaming and other troubles, and offers a scientific solution of these difficulties. We believe it will make you realize more fully than you do already, how destructive of boilers and boiler efficiency untreated feed waters may be.

We believe a study of the booklet will also convince you that we are capable of dealing with the proposition in the most effective manner, and we hope that you will fill out the card at the back of the booklet and send to us with a gallon sample of your boiler feed supply for our analysis and proposition.

Let us have your address and the booklet will be forwarded at once.

Dearborn Chemical Company

General Offices, 332 South Michigan Ave., Chicago
Laboratory & Factory, 1029-1037 West 35th St., Chicago



Endorsement of JORDAN

Commutator Truing Device

Jordan Bros., New York, N. Y.

Gentlemen: If you will refer any of your prospective customers to us we will give you a good send-off, as your machine has saved us lots of money by its use on our rotary commutator.

Yours truly,

Chas. J. Zell, Supt.

Public Service Corp. of New Jersey, Orange, N. J.

JORDAN BROS., Inc., 76 Beekman St., N. Y. City

The Babcock & Wilcox Company

85 Liberty Street, New York

WATER TUBE STEAM BOILERS

Steam Superheaters Mechanical Stokers

Works: BARBERTON, OHIO—BAYONNE, N. J.

BRANCH OFFICES:

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TUCSON, ARIZONA, Santa Rita Hotel Bldg.

Foster Superheaters

Insure uniform superheat at temperature specified

Power Specialty Company

111 Broadway, New York City

WATER SOFTENING OR FILTRATION

FOR BOILER FEED AND ALL INDUSTRIAL USES

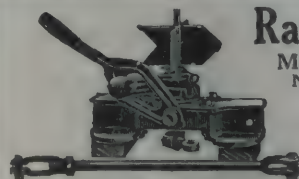
WM. B. SCAIFE & SONS CO.

PITTSBURGH, PA.

Kilby Frog & Switch Co.

BIRMINGHAM, ALA.

Tongue Switches, Mates, Frogs, Curves and
Special Work of all kinds for Street Railways



Ramapo Iron Works

Main Office, Hillburn, N. Y.
New York Office: 30 Church St.

Automatic Switch Stands,
T-Rail Special Work,
Manganese Construction,
Crossings, Switches, Etc.

P & B Insulation

guarantees good electrical service. Electric railway men have been buying P & B Products for 32 years—good evidence of quality.

Weatherproof Tape
Insulating Compound
Baking Varnishes
Air-Drying Varnishes
Solid Compounds

Write for Booklets

The Standard Paint Company

Woolworth Building, New York

Boston Chicago Denver

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co.

Ansonia, Connecticut

7233

The Automatic Reclosing Circuit Breaker

Type AA

Write for Bulletins

The Automatic Reclosing Circuit Breaker Co.

Columbus, Ohio

Localizes D. C. Trouble and Restores Service—Automatically

—the instant the line is again O. K. The protection afforded by AUTOMATIC RE-CLOSING CIRCUIT BREAKERS is complete protection.

A Real Doctor for Sick Commutators!

The "Ideal way" is:
Quick—Efficient—Inexpensive

THE IDEAL COMMUTATOR RESURFACER is a tried and proven abrasive composition (non-metallic and non-copper collecting) which enables any operator to completely resurface the most troublesome commutator without removing the machine from service. High mica, ridges, and "flats" are quickly, inexpensively routed with its sharp cutting surface, and the commutator left in smooth excellent working condition after which an occasional application keeps it so. Think what a saving this means to you in time, labor and lost service! Ideal Resurfacers are made in a variety of sizes and two grades: coarse and fine. Take advantage of our 10 Day Trial Offer today. Decide to permanently remove your commutators from the sick list. AGENTS—Ideal Commutator Resurfacers are in great demand wherever electrical machinery is used. Write for details of our attractive dealer proposition.

IDEAL COMMUTATOR DRESSER CO.

10 So. Dearborn St., Chicago, Ill., U. S. A.

"Everything in Insulation"

Mica	Waxes
Vulcanized Fibre	Asphalts
Varnished Cloth	Compounds
Insulating Tapes	Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.

MITCHELL-RAND M'FG CO.

103 John St., New York City

Murphy Automatic Furnace

232

CONSERVES energy

and triples the steaming capacity of your boilers. Write for Catalog "C."

MURPHY IRON WORKS

Detroit, Mich. U.S.A.

DIXON'S Graphite Brushes

are of uniform texture, free from abrasives and cannot possibly cut a commutator.

Booklet 108-M will interest you.

Made in JERSEY CITY, N. J., by the

JOSEPH DIXON CRUCIBLE COMPANY

Established 1827

GECO

STEAM JET CONVEYOR

GREEN ENGINEERING CO.

East Chicago, Indiana

Bulletin No. 1 Green Chain Grate Stokers.
Bulletin No. 2 Geco Steam Jet Ash Conveyors.

Hale and Kilburn No. 108

for One-Man Safety Cars
and for heavy city service

Only four parts—Steel Aisle
End Support, Steel Wall End
Support, hardwood framed
Rattan Cushion, framed Rat-
tan Back. Note new yoke-
less pedestal.

The
No. 108
is only
One-half
the Weight
of Seats
with Iron
Castings.



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Full power with
High or Lower Adjustment

Many emergencies requiring a
powerful jack present a diffi-
culty in bringing the jack to
bear on the load. The

**Buckeye Emergency
Jack No. 239 Special**

saves time, strength and trouble.
The many positions to which it
is adjustable easily solve per-
plexing lifting problems. Full
details in our catalog. Write
for it.

**The Buckeye
Jack Mfg. Co.**
Alliance, Ohio



Repair Shop Machinery and Cranes

Built by

NILES-BEMENT-POND CO.

111 Broadway, New York

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St. Louis Birmingham, Ala. London

The MOST EFFECTUAL and INEXPENSIVE

method of reducing delays due to "frozen air," "air
failed," "no brakes," "stiff valves," "slow brakes,"
"brakes failed to release," is with an

RECTIFIER

Descriptive matter and prices upon request.

National Safety Device & Man'f'g Co.

3046 Logan Blvd., Chicago, Ill.

HOLDEN & WHITE, INC.,
36 W. Van Buren St., Chicago, Ill.

Distributor for

Ohio, Michigan, Indiana, Illinois, Iowa, Wisconsin and Nebraska



You will buy

CLEVELAND Fare Boxes

Eventually—

Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO



I. T. E. Circuit Breakers

for heavy street railway work are the
best obtainable. Write for New Com-
plete Catalogue.

The Big Three
**D & W Fuses, Deltabeston Wire
D & W Oil Fuse Cutouts**
D & W Fuse Co., Providence, R. I.



JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

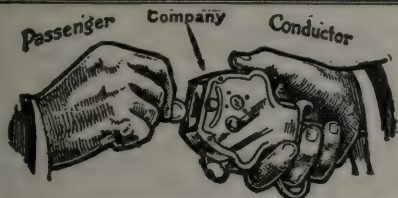
International Specialties Cover the Entire Range of Fare Collection

Money-counting fare boxes; Coin and metal ticket-counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven coin and transfer registers; Motor-driven registers for station, ferry, park and terminal use; Metal and paper registers with single hopper; Round and square registers; Transfer printers; Heeren Enamelled Badges; Punches and Bell Cord.

The International Register Company
15 South Throop Street, Chicago

The famous men of the
electric railway field
contribute the benefit
of their experience to the

ELECTRIC RAILWAY JOURNAL



**Direct
Automatic
Registration**
By the
Passenger
Rooke Automatic
Register Co.
Providence, R. I.

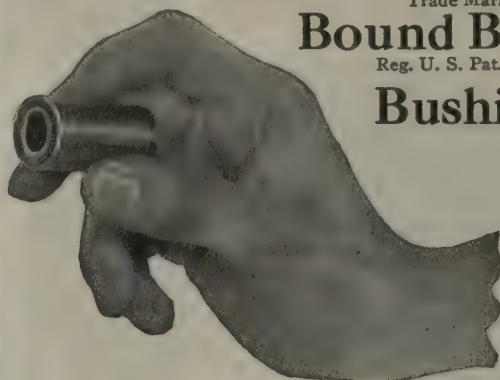
FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, $3\frac{1}{2}$ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

A Recessed

Trade Mark
Bound Brook
Reg. U. S. Pat. Off.
Bushing



This is a close-up of a Bound Brook trolley wheel graphite bushing, showing the neat groove recessed in each end for the insertion of graphite to take care of any end thrust. The graphite placed in these recesses goes through the same careful course of thorough preparation, as the graphite within the casting.

All genuine graphited "Oil-less" Bearings have always been made at Bound Brook, N. J., in the United States of America, by the

Bound Brook Oil-less Bearing Co.
FORMERLY
Graphite Lubricating Company

WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.

VENTILATORS Also Ventilate in Stormy Weather.

THERMOSTATS Save Current.

ORIGINATED the use of **NON-CORROSIVE Wire** for Electric Car Heaters.

ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

Consolidated High Grade Products

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO. Albany New York

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

It's Safe if You Used a
ROLLER LOCK NUT

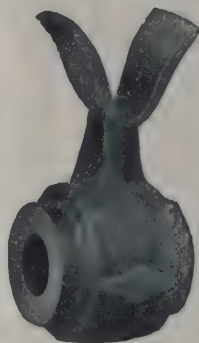


It's the only self-tightening nut on the market. Use it as often as you like, but be sure you always use a *Roller Lock Nut*.

ROLLER LOCK NUT CO.

61 Broadway, New York

**15,000
Miles
of Service**



and yet this Bearing shows no signs of wear.

Why?

Because it was continually lubricated by force-feed—an exclusive feature of Hensley Trolley Wheels.

Send for trial offer.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

Holden & White Inc.

Electric Railway Sales Distributors for:

Wasson Air-Retrieving Trolley Bases. (U. S.)
Garland Ventilators.
Perry-Hartman Self-Centering Center Plates and
Anti-Friction Side Bearings.
Watson Car Lighting Regulator.
Anderson Brake Slack Adjusters.
Reliance Air Sanders.

Chicago District Representatives for:

Drew Line Material.
Columbia Car & Shop Equipment.
Miller Trolley Shoe.
Lincoln Rail Bonding and Bonds.

1508 Fisher Building

CHICAGO

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life **WITHOUT INJURY TO THE WIRE**. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the **LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD**.

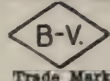


THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this



BONNEY-VEHSLAGE TOOL COMPANY

61 New Jersey R.R. Ave.,
Newark, N. J.

HEATING AND VENTILATING YOUR CARS is the problem to-day. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature *Stewart Hartshorn*

"Zero"

AND

"Motor"

STANDARD for a THIRD of a CENTURY

The Mileage Babbitt

Post's ZERO and MOTOR metals have been standard for a third of a century in shops where mileage records are attained. Nothing but highest grade of virgin raw materials used.

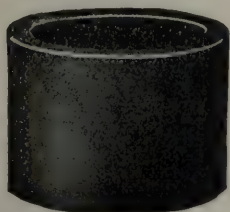
Write us for details.

E. L. Post & Co., Inc., Sole Mfrs., 50 Cliff St., New York City

LONGWEAR BUSHINGS

For Brake Gear

Hardened
Steel
Accurate
Uniform



also
LONGWEAR
BRAKE PINS
to
Specifications

E.G. Long Company

50 Church Street, New York

STUCKI SIDE BEARINGS

are truly frictionless. The roller instead of turning on a pin rolls freely like a rolling pin.

A. Stucki Co.
Oliver Bldg.
Pittsburgh, Pa.

BEACH OIL ELECTRIC CAR

A self-propelled car of the latest type, embodying new and practical features.

Our engineers can help you turn branch line losses into profits.

ELECTRIC CAR & LOCOMOTIVE CORPORATION

Ralph H. Beach, Pres.

165 Broadway, New York, N. Y.

VAN DORN COUPLERS

are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

VAN DORN COUPLER CO.

2325 So. Paulina St., Chicago, Ill.

The "Hycap-Exide" Battery

for

STORAGE BATTERY STREET CARS

THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA



Use them in your terminals—
**PEREY TURNSTILES
or PASSIMETERS**

Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City



Saved from the Ashes as many tickets are, means nickels loss to you. Avoid the risk. Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employees. It mutilates beyond redemption. Scrap sold will pay for the machines.

Ask us for Circular J.
PAUL B. PATTEN CO.

78 Lafayette St.,

Salem, Mass.

U.S.A.

MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading railways. For details address

AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

STANDARD STREET RAILWAY AXLES

ROUGH OR FINISHED TURNED

DIE BLOCKS

MADE FROM ELECTRIC FURNACE STEEL HYDRAULIC PRESS FORGED

Prompt Delivery

GENERAL STEEL COMPANY, Milwaukee, Wis.



AMERICAN CARBON AND GRAPHITE MOTOR AND GENERATOR BRUSHES are made in all sizes and shapes, with or without pig-tails, and in grades suitable for all classes of Motor and Generator service.

AMERICAN CARBON & BATTERY WORKS E. ST. LOUIS, ILL.
OF NATIONAL CARBON CO., INC.

UNION SPRING & MFG. CO. SPRINGS

COIL AND ELLIPTIC

M. C. B. Pressed Steel Journal Box Lids

General Office: Fulton Bldg.

PITTSBURGH, PA.

Works: New Kensington, Pa.

50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.

Missouri Trust Bldg., St. Louis, Mo.

RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS for Monitor and Arch Roof Cars, and all classes of buildings; also
ELECTRIC THERMOMETER CONTROL of Car Temperatures.

141-151 WEST 22D ST. Write for Catalogue 1328 BROADWAY
Chicago, Ill. New York, N. Y.

S-W Shim Slack Adjusters Save Brakeshoes and Labor

SMITH-WARD BRAKE COMPANY, Inc.

17 Battery Place, New York

HORNE RAILWAY DEVICES

Horne Double Acting Brakes

Giant Geared Brakes

Differential Staffs Brakes

Sterling Safety Brakes

Sterling Trolley Bases

Sterling Sand Boxes

Lord Screenless Air Cleaners for Compressors

Q-P Trolley Catchers

Hydrogrounds and Lightning Ar-

resters

Fenders and Wheelguards

Controller Fingers

Friction and Rubber Tape

Packing and Gaskets

Air Hose and Rubber Specialties

HORNE MANUFACTURING CO., 50 Court St., Brooklyn, N. Y.

"Boyerized" Products Reduce Maintenance

Bemis Trucks

Case Hardened Brake Pins.

Case Hardened Bushings

Case Hardened Nuts and Bolts

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

Manganese Brake Heads

Manganese Transom Plates

Manganese Body Bushings

Bronze Axle Bearings

You are a faithful subscriber and reader of the Electric Railway Journal. You know how useful it is to you. Why not give us the names of those of your electric railway friends who would also benefit by being subscribers to the Electric Railway Journal? We will be glad to send specimen copies to any names and addresses that you mention.

ELECTRIC RAILWAY JOURNAL

What Sherman Said of War

Also applies to snow on your tracks

ROOT SPRING SCRAPERS

are the proper tools for fighting snow and we are in shape to make prompt deliveries. Order now.

Root Spring Scraper Co., Kalamazoo, Mich.



Samson Bell and Register Cord

Solid braided cotton, extra quality. All sizes and colors. More durable, more economical and better looking than leather or rawhide. Send for samples and full information.

SAMSON CORDAGE WORKS

BOSTON, MASS.

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word**, minimum charge 50 cents an insertion, payable in advance; less 10% if one payment is made in advance for 4 continuous insertions.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want

ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word**, minimum charge \$1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost \$2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/4 p. (1 1/2 x 3 3/4 ins.).....	\$5.00	1 in. (1 x 2 1/2 ins.).....	\$3.00
1/2 p. (2 1/2 x 3 3/4 ins.).....	10.00	4 inches (4 x 2 1/2 ins.)..	11.60
3/4 p. (3 1/2 x 3 3/4 ins.).....	20.00	8 inches (8 x 2 1/2 ins.)..	22.40
1 p. (4 1/2 x 3 3/4 or 5 x 7 ins.)....	40.00	15 inches.....	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page.....	\$80 a page	18 pages.....	\$56 a page
3 pages.....	72 a page	26 pages.....	52 a page
6 pages.....	64 a page	32 pages.....	50 a page
9 pages.....	62 a page	40 pages.....	48 a page
12 pages.....	58 a page	52 pages.....	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

FOR SALE

New Lockers for Sale

100 new Durand Steel Lockers, 72 x 15 x 18, in original crates. Will sell at old price. New York Contracting & Trucking Co., 1170 Broadway, New York City.

POSITIONS WANTED

ACCOUNTANT—Experienced organization and efficiency work. Wider field wanted. Present salary \$4,000. PW-12, Elec. Ry. Journal, Chicago.

AUDITOR—Expert electric railway accountant, ten years' experience, both city and interurban, desires change. Married; excellent references. All communications confidential. PW-11, Elec. Ry. Journal.

AUDITOR, secretary or treasurer of interurban road; 15 years' experience; fully acquainted interstate commerce commission requirements; furnish excellent references and bond as required. PW-2, Elec. Ry. Journal, Chicago.

CIVIL engineer, age 40, mechanic, 25 years' experience building construction, municipal and electric railway engineering; good draftsman, fieldman, superintendent. M. Bernhardt, 36 Day Ave., Roanoke, Va.

WANTED

Rotary Converter

Rotary Converter and Transformers:

300 KW. Rotary Converter: 370 AC, 25 cycle, 600 volt DC.
3—13,200/370 volt, 25 cycle Transformers for above Rotary.
State price and delivery.

SOUTHERN NEW YORK POWER & RAILWAY CORPORATION
Cooperstown, N. Y.

RAILS Locomotives, Cars, Machinery, Piling, Tanks

We've got too much to list here, so we've issued

68 pages **BULLETIN 230** Get it now!
ZELNICKER IN ST. LOUIS

POSITIONS WANTED

GENERAL manager of small road or executive to general manager; large experience in all departments, age 42; first class references; bond furnished any amount. PW-1, Elec. Ry. Journal, Chicago.

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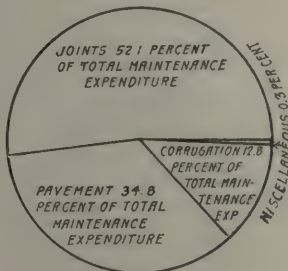
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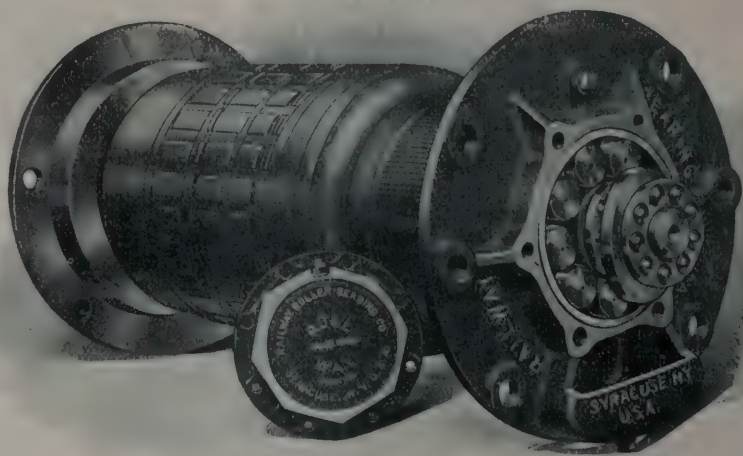
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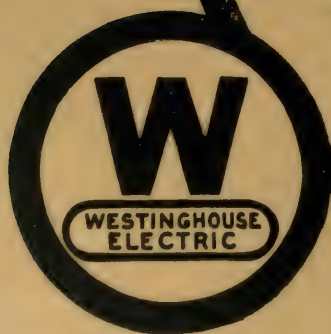
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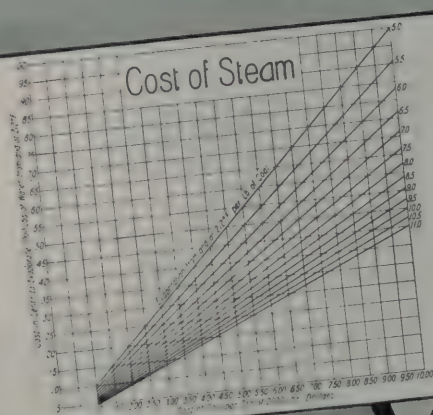
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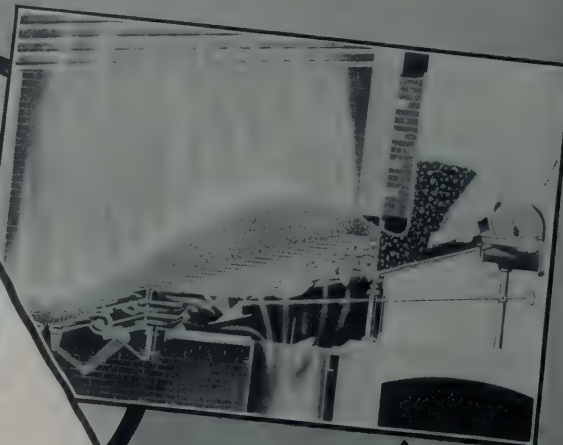
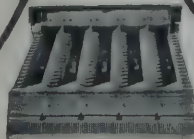
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Westinghouse

Underfeed Stokers



Knowing the price and the amount of coal burned, and the quantity of water evaporated, the above table will tell you what it should cost you in cents per lb., to generate steam. This is a very useful table. We will gladly mail you a copy upon receipt of your name and business address.



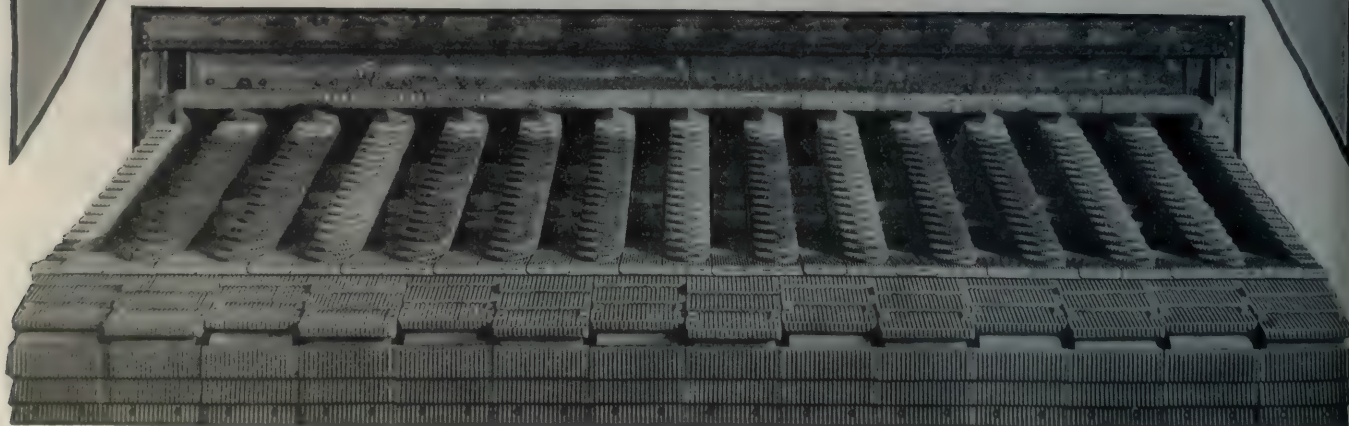
Economy and Reserve Capacity for All

Even if you have but one or two small boilers, there is no reason why your economies and your reserve capacity should not be relatively equal to those of the big central station.

Westinghouse Underfeed Stokers are built in many sizes and for all steaming requirements.

Westinghouse Electric and Manufacturing Company
East Pittsburgh, Pa.

No waste—No idle equipment—No Banked Fires— No Boilers to be held in readiness for the daily peaks. FOR, the Westinghouse Underfeed Stoker embodies in its design a wonderful flexibility— a tremendous overload capacity.



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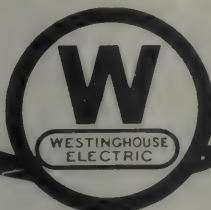


Westinghouse Air-Blast Transformers of the Structural Type, installed in the Public Square Substation of the Cleveland Electric Illuminating Co., supplying power for two 2000 KW Westinghouse Booster Converters.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Sales Offices in All Large American Cities

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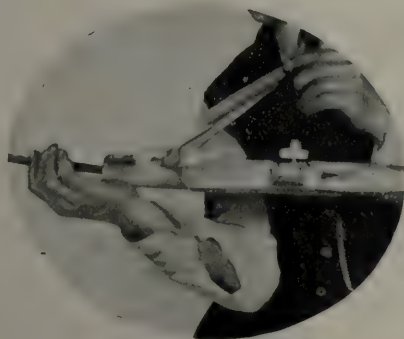


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O-B Type E Frog, adapted for high speed service and for use where various types of cars are operated



Slip tip under hooks—



Turn over and down on the wire—



Clinch the lips and the job is done.
Renewal of tips is just as easy

O-B Trolley Frogs Simplify Maintenance

The line must be kept in good condition even though the winds are strong and the mercury registers zero.

And it is under such adverse conditions that the good qualities of O-B Trolley Frogs—Types D and E—are emphasized.

They go up in a hurry. The wires are held in a single, powerful clamp, secured in the Type D by one bolt—in the larger Type E by two bolts and lock washers.

O-B Cam Tips form the approach. The illustrations on the left tell their story.

Altogether there are only six parts in the Type D and nine in the Type E.

Such simplicity is valuable any season of the year. It saves valuable time and minimizes traffic delays.

O-B Frogs are well designed and sturdy. They are good for long, hard service.

Catalog No. 16 lists the complete line of O-B Line Materials.



O-B Type D Frog, suitable for moderate speeds and all general city service

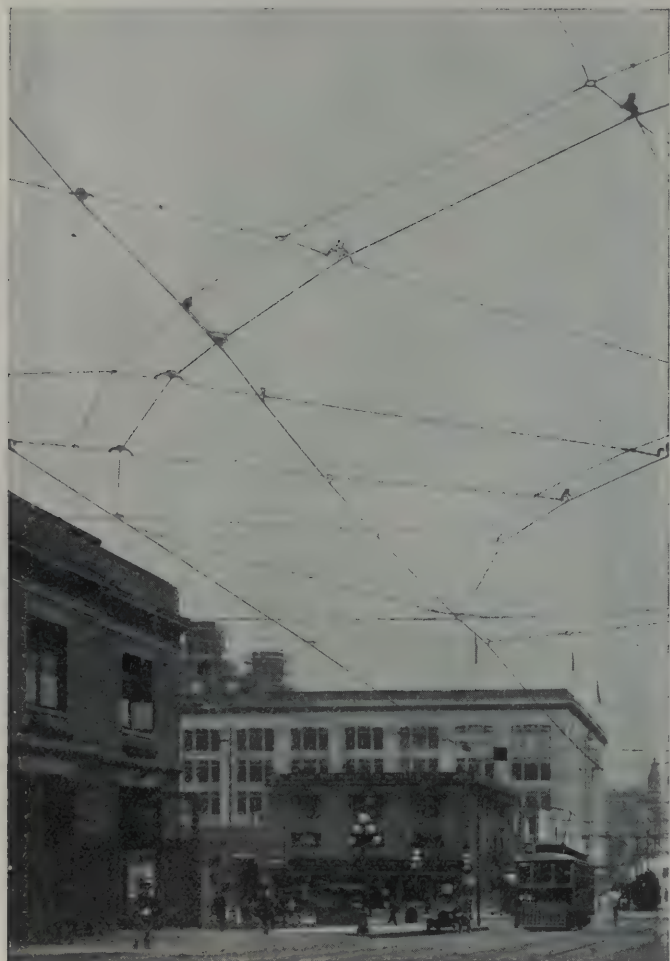
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Conductivity Soon Beats Copper
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In a couple of years its superiority in conductivity is literally **worn off**. After that it is not only lower than Phono-Electric in conductivity, but also greatly weakened and subject to breakage.

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Bridgeport Brass Company
Bridgeport Connecticut

Concreting 1320 Ft. of Track Daily

INTERNATIONAL STEEL TWIN TIES

Make That Schedule Easy

200 cubic yards of concrete is being mixed and placed in 10 hours by a gang of twenty-five men on a number of street railway properties. With 800 cubic yards of concrete to the mile of steel twin tie track below the rail base, this gang will concrete completely 1320 ft. of track in 10 hours.

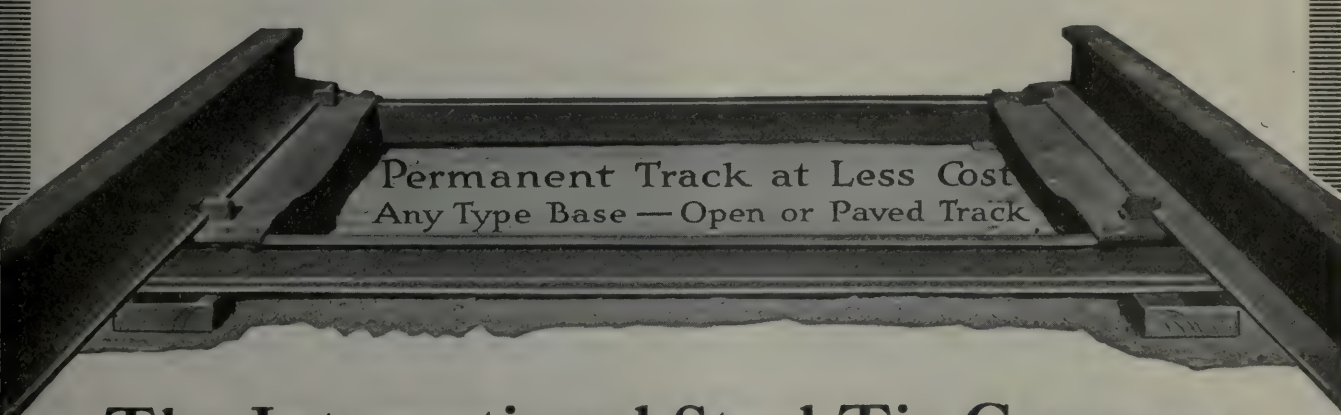
Steel twin ties in a seven-foot trench and with seven inches of concrete in bearing below the tie plate require less than 800 cubic yards per mile of track. That's why you can speed up the job to 132 ft. of track per working hour. Less Equipment and fewer men would not move so fast, but the ratio of progress would remain the same.

In addition, the excavation is reduced 50% and the number of ties to handle 66%. These also mean labor saving. And your track is out of service for a shorter period.

Ask the users of steel twin ties if you want to check these facts.

A stock of low-priced steel in hand insures a "rock bottom" price and prompt delivery. Order now and you'll be a regular user next year.

Prompt deliveries made from stock



Permanent Track at Less Cost
Any Type Base — Open or Paved Track

The International Steel Tie Company

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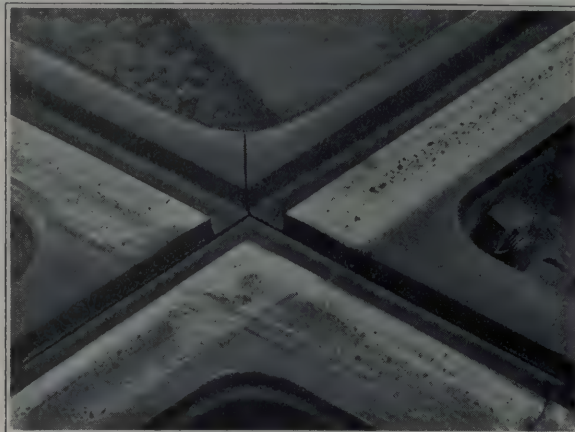
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What Happens to a Rolled Rail Crossing



How a Balkwill Articulated Cast Manganese Crossing Behaves

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of a rolled rail crossing are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill articulated cast-manganese crossing the difficulty is

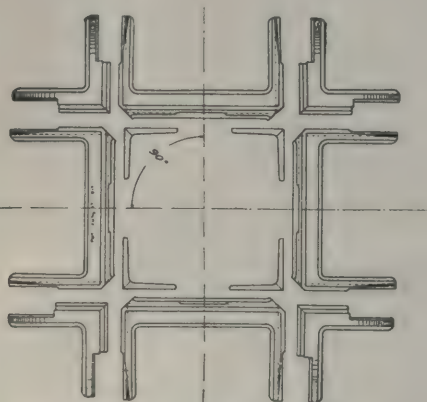
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage.

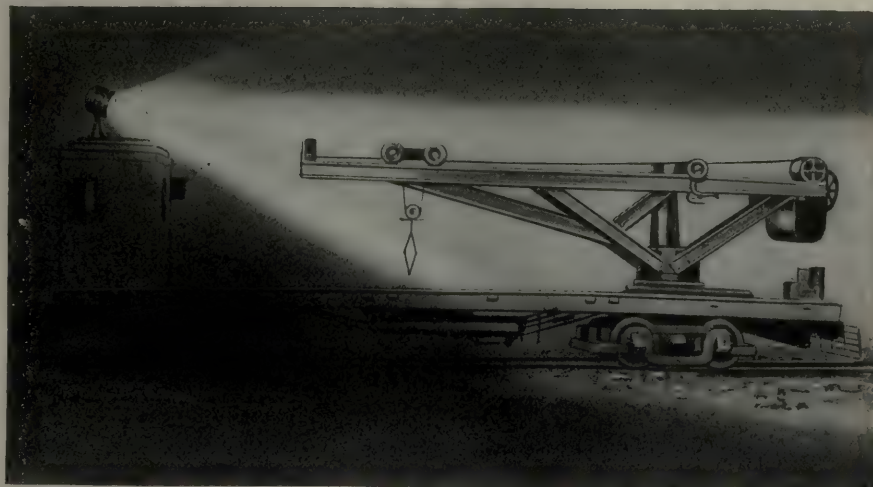
**Order Balkwill Articulated Cast Manganese Crossings
Direct from Your Special Work Manufacturers**

The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio

More Light for Your Workmen

"Golden Glow" Car Floodlighters



Showing Car Illuminated by "Golden Glow" Projector

For illuminating your cars, track or overhead to facilitate repairs or construction work at night. They replace the common, inefficient bank of incandescent lamps with a powerful projection of "Golden Glow" light.

Write for catalog giving complete details.



Type CSB-128

"Keystone" Portable Lamp Guards



Convincing Evidence of the Strength of Keystone Portable Lamp Guards

No lamp guard is really good unless it is so strong that a man may use it without "being careful." If he has to protect the lamp guard in the slightest degree it is detracting from his work.

Keystone Portable Lamp Guards are the strongest, being formed of Bessemer steel wires electrically welded together and heavily tinned. A workman can kick them, stand on them or throw them about without damaging the guard or lamp.

Get Keystone Portable Guards for your men. They want them.

Write for bulletin showing many different types



No. 12504

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

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17th and Cambria Sts.

NEW YORK
50 Church St.

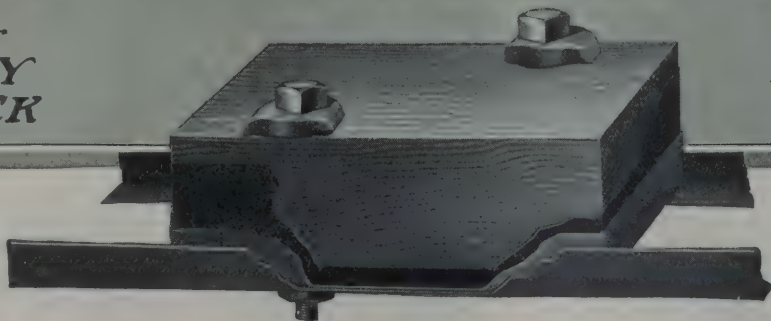
CHICAGO
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg

The MECHANICAL RAILWAY TIE

For
CITY
TRACK

For
INTERURBAN
TRACK



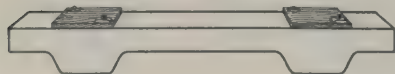
Mechanical Ties Guard Your Track Against Becoming Center-bound

Remember, the Mechanical Tie, when installed, is a positively rigid unit proof against stresses or strains from any angle. It is practically a non-conductor of vibration. It insures perpetual correct level, gauge and alignment. And its maintenance in service is so low as to be practically negligible.

The Mechanical Tie, while light enough to be easily handled by one man, is, when installed, far stronger than ordinary wood ties.

This fact alone is a safeguard against the perils due to center-binding in open track.

But your principal assurance against center-bound tracks when you use Mechanical Ties, is that the method of installations made imperative by their construction and principle eliminates, automatically, the construction faults which are usually accountable for tracks becoming center-bound.



*Let us explain this feature to you in detail.
To have this information may help solve your problem.
Your inquiry implies no obligation.*

THE
DAYTON MECHANICAL TIE CO.

201 Third Street Arcade
DAYTON, OHIO

Provides the Desirable Qualities of Wood Plus the Strength of Steel, the Permanence of Concrete and the Resiliency of Asphalt— A NonConductor of Vibration



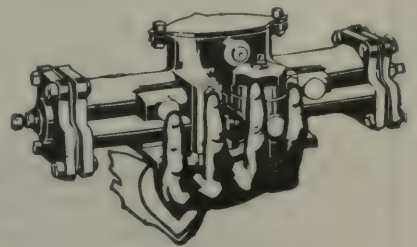
National Pneumatic Door and Step Control

for North Carolina's Safety Cars

The North Carolina Public Service Company, Greensboro, N. C., has recently received fifteen light-weight, single-truck, double-end Safety Cars of the type illustrated.

As each car will be run with a single operator, quick and easy movement of all mechanism was important.

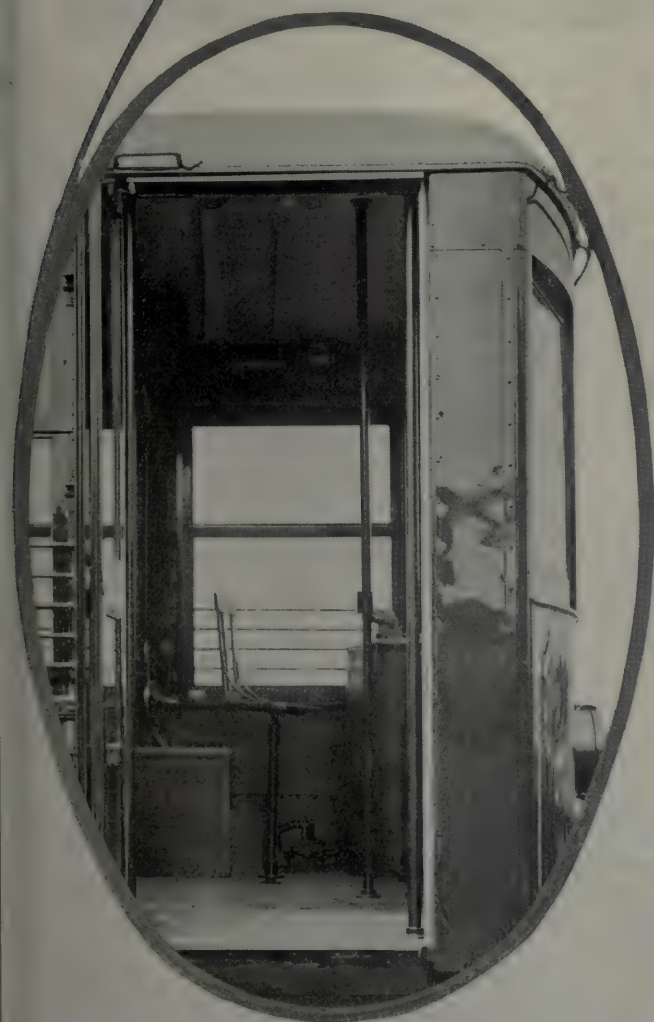
Hence the management wisely decided to adopt the famous automatic door and step control, brake and sander combination of the Safety Car Devices Company, which combination includes **National Pneumatic door engines** as a regular feature.



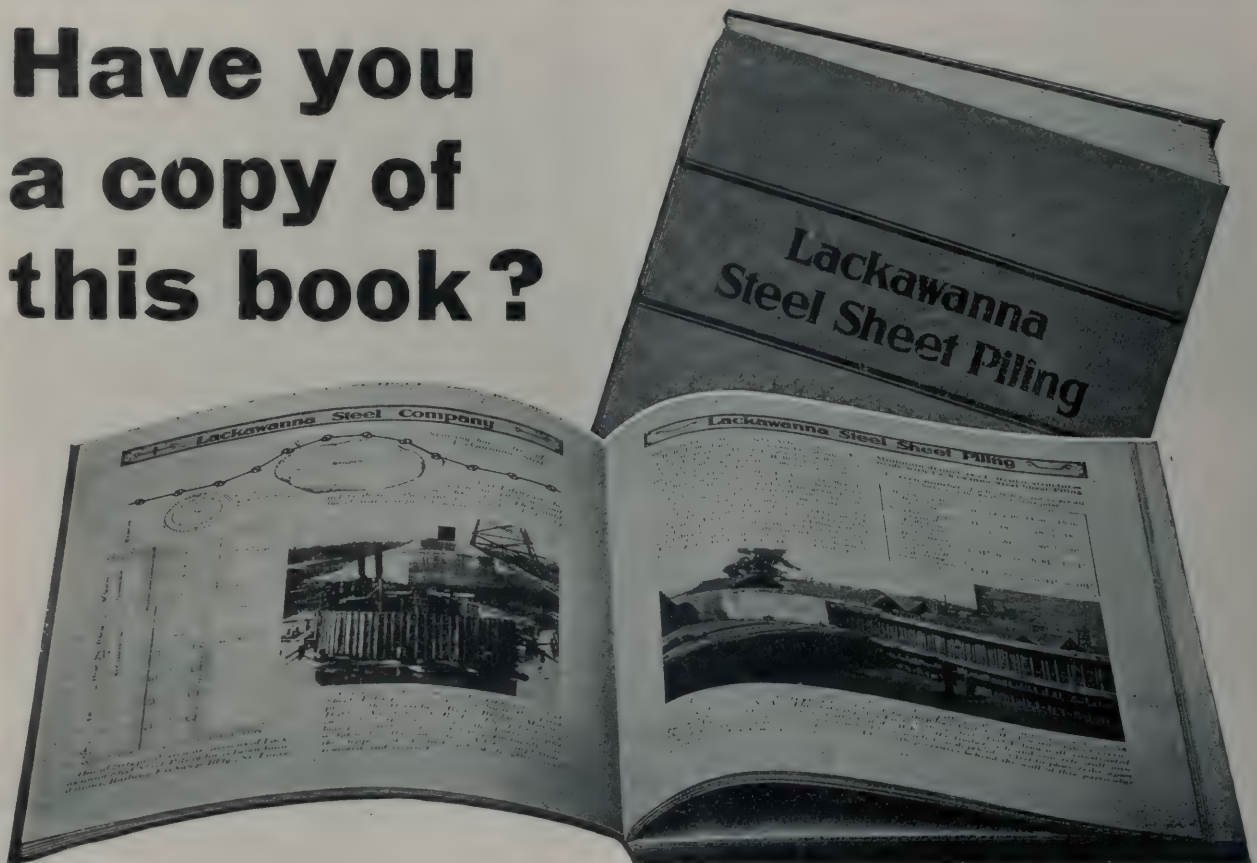
National Pneumatic Company

50 Church Street, New York

515 Laflin Street, Chicago



Have you a copy of this book?



Some Subjects Which Its Pages Cover.

How best to protect adjoining property from adjacent deeper excavation.
How best to treat difficulties in steel sheet piling wall construction when irregular places or sunken obstructions are encountered.
How to keep water out.
How or why steel sheet piling is most economical.
Sizes, weights and mathematical properties are given for an economical section of type of steel sheet piling.
What is the best method and rig for driving under special conditions.
How to assure water-tightness at steel sheet piling joints.
How long steel sheet piling may be driven to advantage.
How to excavate deeper by splicing steel sheet piling or telescoping cofferdams.
How tops of a line of steel sheet piling can, if necessary, be cut to uniform elevation.
How best to pull and recover temporarily installed steel sheet piling.
How permanent installations can be made practically proof against corrosion.

THIS text book, although *not* just off the press, is occasionally featured in one of our advertisements, because many otherwise well-informed engineers and managers do not know what a comprehensive, reliable and handy reference book on Steel Sheet Piling is theirs for the asking—and how thoroughly we have anticipated their questions and needs.

The discussion of subjects indicated at the left points out important economies and possibilities, but the book is only an index to Lackawanna Service, which includes personal advice, and if desirable, elaborate tentative designs and suggestions for execution.

Remember, too, that our friendly interest lasts throughout every installation, and even goes so far as to loan a pulling grip for the removal of sheet piling that has served its purpose.

If you are a consulting, designing or managing engineer, send for this book and tell us how and when we can help you.

Lackawanna Steel Company

General Sales Office and Works: Lackawanna, N. Y.

ATLANTA
BOSTON

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CHICAGO

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NEW YORK

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ST. LOUIS

SAN FRANCISCO
HAVANA

Licenseses for the manufacture of Lackawanna Steel Sheet Piling:

For Great Britain and British Colonies in the Eastern Hemisphere, Cargo-Fleet-Iron Co., Ltd., Middlesbrough, England.
For France, Italy, Spain, French Colonies and Protectorates, Italian Colonies and Spanish Colonies in the Eastern Hemisphere: Cie des Forges & Aciéries de la Marine et d'Homecourt, Paris, France.



BOSTON, about the middle of the last century, was a discouraging prospect for street railways. Its narrow streets in the business district made traffic difficult and it was not until 1872 that the great Boston fire, by wiping out a large part of the business district made feasible a change of the conditions so adverse to effective rapid transit.

State Street, Boston, 1842

The Rebuilding of the City

brought with it an undreamed-of expansion of mechanical transportation.

Today there are 486.52 miles of track in the service of the Boston Elevated Railway alone, while the trackage of the whole municipality comprises 1524 miles.

Naturally, such an enormous expansion of

the industry all through the country, as well as in cities of great growth, presented constant problems.

Neither the most nor the least important of these was presented by the necessity of efficient lubrication that could meet all the constantly changing conditions.

And it was in this connection that the enormous value to the industry of

Galena Oils

and Galena Service has been so thoroughly shown. Galena Oils and Service have grown with the industry. They have definitely put the work of lubrication on an exact economic, scientific basis.

Galena Service is always at your service.

Galena-Signal Oil Co.
Franklin, Pa.

"Electroheat"

—the Mark of an Achievement in Axle Making



TRANS-
PORTA-
TION progress of late years has imposed service conditions in electric railroading al-

most undreamed of but a few years ago. Operating men have called incessantly for improvements in axle building that would insure larger safety factor and greater wearing qualities.

Laclede Steel engineers have perfected a process for heat-treating forged steel axles which has since demonstrated that it not only meets existing standards of service but **exceeds** them in every qualification.

"Electroheat" is the mark of this achievement. It stands for **better**

axles—signifies a process giving absolute uniformity in manufacture, and a refinement of steel impossible by old-time methods of heat treatment.

Service failures due to breakage, bending and excessive journal wear are minimized in "Electroheat" Axles because the entire process of annealing or quenching and tempering the steel forgings is carried forward at the **exact** desired temperature **uniformly** applied. Fluctuating temperatures and uneven heating—all "hit and miss methods" of the old school—are eliminated.

That's why "Electroheat" Axles **have** to give better service!

Note: "Electroheat" Armature Shafts possess the same torsional and shock-resisting qualities as "Electroheat" Axles, being heat treated by the same process. They minimize service breakdowns and maintenance costs.



"If Heat-Treated Electrically—It's A VALSCO"

LACLEDE STEEL COMPANY

General Offices—Federal Reserve Bank Building

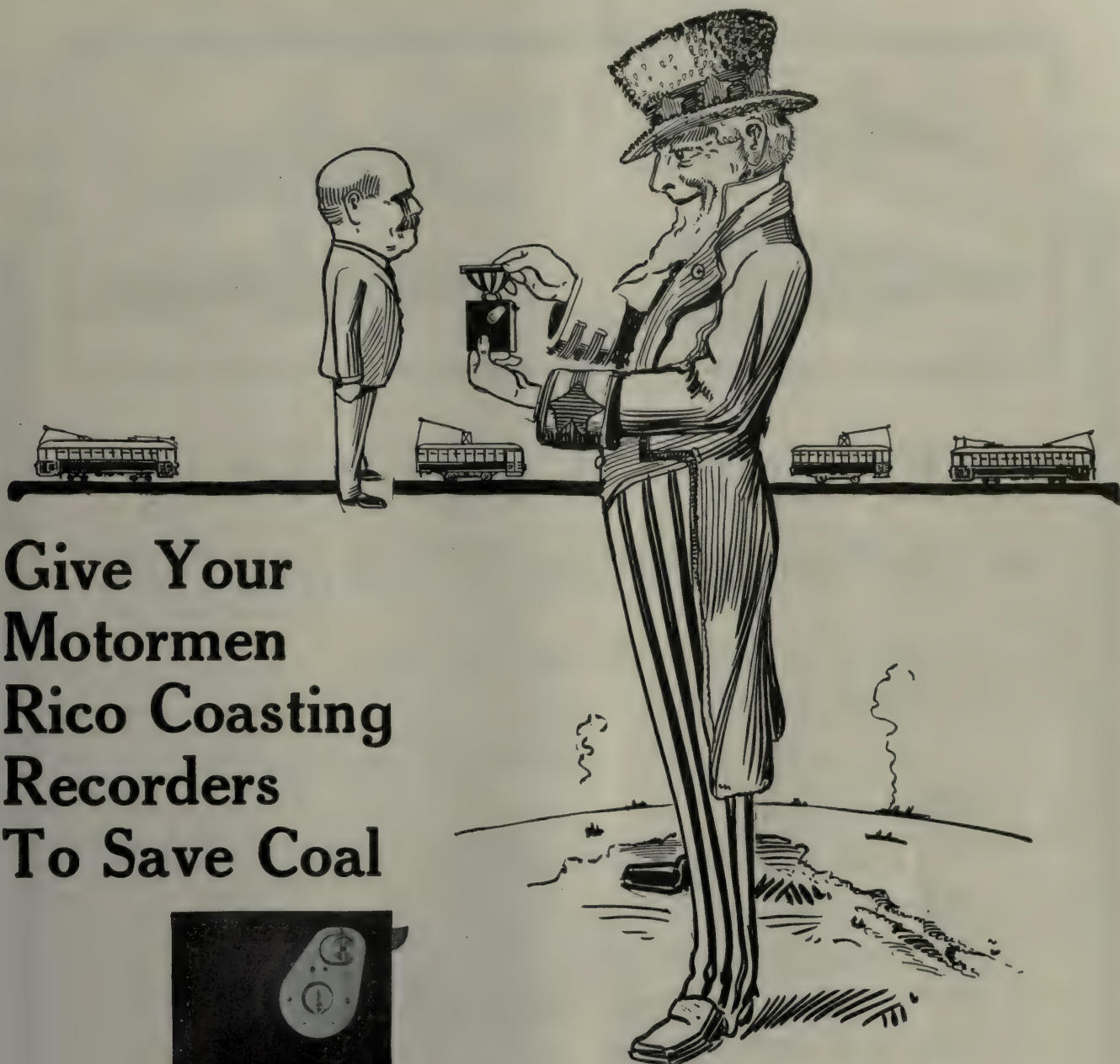
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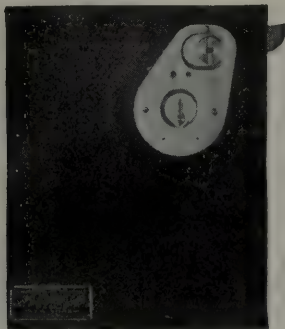
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ST. LOUIS—Grayson Railway Supply Company

ST. PAUL—Rank & Goodell
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SAN FRANCISCO—F. F. Bodler
PORTLAND, ORE.—W. F. McKenney
TORONTO, CAN.—Railway & Power Eng. Corp., Ltd.



Give Your
Motormen
Rico Coasting
Recorders
To Save Coal



Uncle Sam would pin a medal on every manager now preventing waste of coal through the efficient aid of

Rico Coasting Recorders

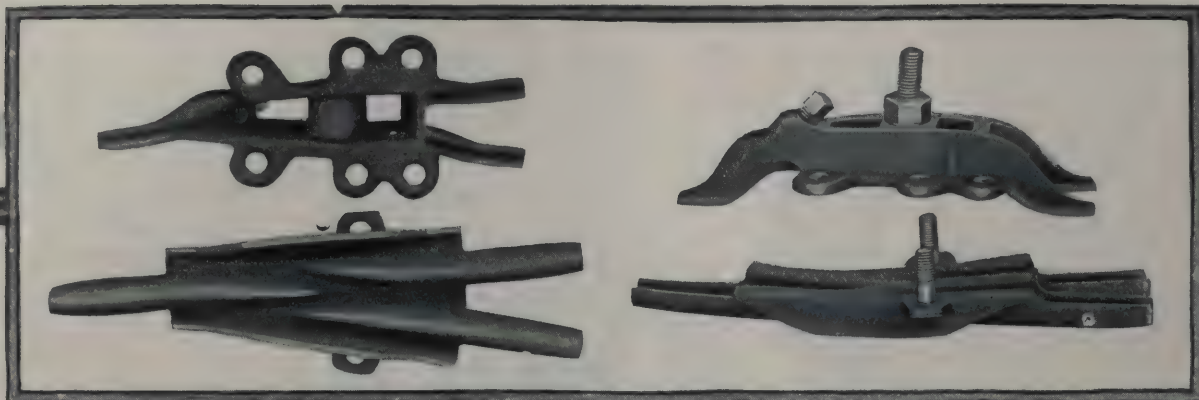
You can make *your* property equally efficient *permanently* by furnishing your men with Coasting Recorders. They give a record of coasting. Everybody agrees that **THE WAY TO SAVE POWER IS TO COAST.**

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK



G-E Light Weight Frogs with Renewable Wearing Pan

Keep down maintenance costs.

Have Low First Cost.

Wearing part replaced at one-half the original cost.

Traffic schedule interference reduced to a minimum.

Changes made in two minutes. Handling of wires or pulling up tackle unnecessary. Just bolt on new pan.

General Electric Company

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Schenectady, N. Y.

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"Just bolt it on"

7442



A New Pan Makes the
Frog as Good as New

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, January 26, 1918

Number 4

This, if It Exists, Is a Baseless Fear

ELECTRIC railway equipment and operation are not perfect, and never will be for that matter. Improvement is always possible and ought to be, for the general good. And the best way to improve is to discuss shortcomings and methods of removing them. In some quarters there seems to exist a fear that if the electric railway's limitations are "aired" and discussed, such discussion will act as a boomerang when justice at the hands of the public is requested. In other words, the idea is that the commissions will refuse the boon of higher fares and relief from unjust burdens until the railways can show that their operation is perfect and their managers are altogether omniscient. Now the whole theory of regulation is based upon the supposition that the commissions know all of the facts, pro and con. If they do not get the operating limitations of the electric railways from the latter, who understand these limitations, they will get the information in roundabout ways, and possibly in distorted form. Any suggestion that is constructive and practical should be freely and openly discussed, as also should every advance in electric railway design, construction and operation.

Why Water Power Is Not More Extensively Used in This Country

IN THESE strenuous days of fuel shortage the problem of effectively using our enormous water-power resources naturally becomes more than usually a live one. The perennial nature of this power makes it especially attractive because we all realize that, once exhausted, our coal and oil resources can never be replaced. Viewed in the abstract it would appear to be only ordinary common-sense to use the water and make the coal and oil last as long as possible. In the concrete, however, this does not work out as an economic possibility, certainly not under present restrictions as to the use of government-controlled water powers.

Some water power is used in supplying electric energy on electric railways, from 10 to 15 per cent of the total generating capacity being in water turbines. Electric railway companies also purchase water-generated energy to a considerable extent. Railway managers should therefore be familiar with the technical and statutory limitations which handicap water power in competition with steam. These are clearly set forth in a report just presented by Calvert Townley, as the representative of the Engineering Council, to the United States Chamber of Commerce, and abstracted in the present issue of the JOURNAL.

The fact is that, considering the inherent inferiority of water power, the great cost of utilizing it (including the necessary provision of a steam reserve), and the

remarkable advances made in the art of producing energy from steam, the latter is in general the cheaper power. No unnecessary restrictions should, therefore, be permitted to hamper the application of water power in such fields as are open to it. Mr. Townley's report, while condensed, is an admirable and readable presentation of a vital subject which is ordinarily enshrouded in verbiage or fenced in with technical formulas.

Five Cents No Longer Pays for Chicago Elevated Ride

THE first mention in Chicago of a plan to appeal to the State utilities commission for additional revenue for the elevated roads has stirred up a whirlwind of opposition. The people of the country's second largest city have not yet awakened to the fact that times have changed and that other state commissions have been trying to put public utilities on a paying basis. President Budd of the Elevated says in a public statement: "You have grown so accustomed to being carried all over town for a nickel that you never gave a thought to whether you were being carried for less than cost."

This is a rude awakening for Chicago's 2,500,000 people. They have become used to advanced prices on everything else. They know the nickel is not as big as it used to be for purchasing any commodity or even for steam road travel. But they have been raised on a bottle labeled "One city—One fare—Five cents," and they believe their growth will be stunted if that label is changed. That same bottle was used in 1860 when the first car lines were built and the city's area was only 20 square miles. It is still being used when the city has developed into an infant spread over 200 square miles. These people have heard with pride from an expert traction commission that the average length of journey is greater than that of other cities. They boast that it is possible to ride some twenty miles on the elevated or thirty-three miles on the surface lines for a nickel with transfers. What a shock therefore to be told that they have been getting more than their money's worth!

Action on the proposed petition of the elevated roads will be awaited with interest. The Illinois State commission will have a chance to show whether it measures up to the standard of other state bodies which have acted without fear of popular clamor. Already the Illinois commissioners have given limited relief to certain roads, but it remains to be seen whether the "one city—one fare" fetish is held too sacred to be broken in the case of Chicago. The elevated roads are in a different position from the surface lines. They are organized under the "steam road act," which does not have a twenty-year limit for franchises. The surface

lines have ordinances which expire in 1927. Both surface and elevated roads have offered to surrender their present franchises on a basis which will permit of their consolidation.

The proposed plan involves a "new deal" with a protected rate of return in accordance with the principles of modern partnership agreements. However, the working out of a settlement on this basis is still remote, and in the meantime it is not surprising that President Budd has given notice that some relief must be had at once if the people are to have efficient service and the stockholders are to receive a return on their investment which they have not been able to obtain for some years.

The Cities Desire Regulation by Confiscation

THE politicians in charge of the affairs of the municipalities in the State of New York have boasted that they would not abide by the decisions of the Second District Public Service Commission in the 6-cent fare cases, but would undertake political reprisals. The first step in this direction is the introduction in the Senate of two bills which would work a radical revision in the public service commission law. In these, Senator G. F. Thompson revives the old proposal to have only one commission for the State, but he has added the provision that the chairman shall be elected by popular vote. The animosity of the associated city attorneys is thus clearly evident. The cities want a commission that will fix rates regardless of justice and reasonableness. They desire a presiding officer who will consider the political consequences of his every utterance rather than enforce the law as he finds it.

The worst feature of Senator Thompson's bill, however, concerns the proposed restriction of the rate-making power of the commission. The law which he proposes would contain these retrogressive clauses: "Nothing in this chapter contained shall be deemed to permit the commission or any court to increase any rate which has been heretofore, or may be hereafter, authorized by statute; nor shall anything in this chapter contained be construed to permit the commission, or any court, to make a determination or decision that the rates established in, or as the consideration for, the grant to any public service company of any charter, franchise or privilege are unjust, unreasonable, unjustly discriminatory or unduly preferential."

Such legislation would be expected from a Bolshevik party intent upon the destruction of property. The certainty that the right of the courts to examine statutory rates for confiscatory features cannot be impaired; the fact that rates fixed by franchises make no allowance for future development, or even existence under increasing burdens; the fact that the proposed law would mean a total paralysis of utilities—these are matters of no concern to the cities' representatives.

The passage of such a bill would mean a decade or more of poor service in the State of New York. It is hardly conceivable that the people will sit quiet while false friends inflict such an incalculable injury upon them. It is the duty of every public-spirited citizen to be alert to block such legislation and to disseminate as widely as possible information concerning the lamentable shortsightedness of such proposals.

A Reaction in Electric Railway Affairs Is Due Soon

SOME diagrams of the present economic status of the electric railway, printed elsewhere in this issue, might discourage even those inclined to be most optimistic if considered, without reference to the wider outlook, as reflecting a permanent condition. No doubt the industry is having "hard sledding" during these war days in which many industries are prospering hugely. No doubt, again, it is almost impossible to get new money for necessary improvements and to earn money enough to keep property in repair. But granting that the business is essentially sound, and that a vital service is supplied by the electric railway, there is just cause for an expectation of a turn in the tide.

There is a law of nature which requires that every force shall produce a reaction. For example, we start a car, and its inertia imposes a reactive force which requires power to overcome. The same inertia is the cause of resistance to stopping when the brakes are applied. The present low ebb in electric railway affairs, aside from the transient effect of the war, is due to two things. First, the public has expected too much in return for what it has been willing to allow. Second, railway transportation is not up with the times.

The reaction against the present conditions will correspondingly appear, it is in fact already beginning to appear, in two ways. On one hand burdens will be lightened and fare limits raised; on the other the lessons taught by the jitney and the private automobile will be applied in the furnishing of better transportation. The men who are laboring intelligently to bring about these changed conditions see a bright future for the industry. The pessimists are those who either are doing nothing constructive, or have failed to look at the matter in a large way.

Philadelphia Lease Lays Good Basis for Future

PERHAPS Philadelphia is slow. Sometimes, however, slowness is simply the result of deliberation, of hunting for the right, of trying to use all the foresight possible. That seems to be the case in connection with the new rapid transit agreement, just approved by Councils, signed by the Mayor and now awaiting the signature of the Philadelphia Rapid Transit Company. After a long period an unusually flexible plan has been evolved for unified operation of city and company lines.

The foresight shown in preparing the lease is evident from a glance at the underlying principles. These are that such unified service as the people desire should be furnished at minimum cost; that the cost of that service should be supplied by the users, and that the authority of the Public Service Commission to regulate service and fares should be fully recognized. To put it another way, the fundamental idea is to secure and maintain the desired service, and to make the fare fit the service. Philadelphia thus desires to avoid the economic error, prevalent in the past, of imposing burdens which may later become unbearable under fixed fare and operating regulations. The Philadelphia lease is in accord with modern ideas and the joint interests of all parties in transportation development.

The lease provides, of course, for ultimate recapture if the city so desires. Other detailed provisions also deserve mention. The use of a Supervising Board is not novel, but it is rather unusual to have its place in the general regulatory scheme defined with such an exact recognition of the larger interests involved. This board, for example, will have no power to alter, postpone or delay the building or operation of any line desired by Councils. Furthermore, it must not usurp any power vested in the Public Service Commission. It is expected that matters relative to maintenance and service will be heard more expeditiously by the board than by original application to the commission, but appeals can be made to the latter body or applications made directly to it on matters where it has jurisdiction. This seems a proper definition of powers for a local body of experts under state regulation.

In regard to the flexible fare and the position of the return to the company the Philadelphia lease makes a marked departure from preceding partnership agreements. The basic ideas of the others have been the maintenance of a 5-cent fare, the protection of the return on the company's old investment by means of preferentials, and the meeting of deficits in the city's return by taxation. This question of the division of the financial risk was debated long in Philadelphia. In December, 1916, the company submitted a proposal for a guaranteed 5 per cent return on its stock with a further share in surplus earnings, all future risks being substantially assumed by the city. In the following August representatives of the city and the company reached an agreement under which the company assumed the risks, its return being dependent upon action by the Public Service Commission as to rates of fare. The city representatives agreed that a dividend of 4 per cent would be reasonable, and that the city would join with the company in an appeal for a fare increase if the rate of return on stock fell below this percentage. Under the present lease, however, the business risk is shared alike by the city and the company (*i. e.*, in proportion to their investments), and the latter's dividend is limited to 5 per cent.

This division of risk, of course, is permissible only because of the protection afforded to the company's return by the adjustable fare. Under a carefully worked-out plan, the Supervising Board must under certain conditions file a new schedule of "fares and charges" with the Public Service Commission. Although the lease is not explicit on the point, we assume that such terminology would permit a zone system if this were desired. While it is stipulated that the rates must always be sufficient to meet the requirements of the lease, the final approval is left where it belongs—with the commission. Whether the rates are revised upward or downward, however, the city must share the results equally with the company. Thus, although the equal division of the business risk is a novel provision, it seems to be so arranged for as to insure co-operation between city and company in securing rate adjustments.

While, as stated above, the lease contemplates that the car-rider will pay for the service, the future of this point is not fixed. A definite provision is inserted to enable the municipality at its option to reduce the fare requirements by relinquishing, to the amount and the length of time desired, the rental for the city-owned high-speed lines. This again is a clause written for

the future. Preceding partnership agreements have generally recognized that rapid-transit development is a civic improvement that is bound to result in early years in deficits which the taxpayer and not the car-rider should pay. The Philadelphia negotiations have begun with the assumption that the car-rider will be able, perhaps with fare adjustments, to carry the burden. If not, the way to overcome the difficulty is open. Only the future can determine what the taxpayer will be called upon to meet. The experiment, however, will be useful in giving some indication of what the car-rider is capable of financing.

The prime requisite of a good partnership agreement is that it shall be fair in abnormal as well as normal times. This the Philadelphia lease seems to have secured. Over a long period of time—until 1957—it permits a reasonable adjustment of service and fare, and a comprehensive transit development. It represents a great advance in constructive and far-visioned franchise drafting.

A Rail-Wear Test of Unexpectedly Long Duration

THERE seems to be an increasing sentiment among many engineers in favor of adopting the tram girder rail under certain circumstances when the uses of the preferred T-rail is not permitted. The subject has been under discussion in these columns for some weeks past and is still open for discussion. As a result of the discussion to date we suggest that the Engineering Association committees on way matters and standards consider the inclusion of a tram rail section among the standards when next the *Engineering Manual* is revised.

The fact that under changed conditions of street traffic the tram rail is coming back into its own renders even more interesting than it otherwise would be the article on "An Experimental Study of Rail Wear" which R. C. Cram has prepared for this issue of the JOURNAL. The rails covered by this study were tram rails. They were laid more than twenty years ago, and still have some life in them in spite of the fact that nearly 10,000,000 car wheels have passed over them. It is not often that engineers have opportunity to continue a test for more than two decades. The circumstances which made such a long test possible in this case were accidental, but by following up such clues as remained Mr. Cram was able to make at least partial scientific use of them. By so doing he has considerably increased the value of A. J. Moxham's famous A. S. R. A. paper on "Rails—Their Construction from a Scientific Standpoint," read in 1898.

When Mr. Moxham read his paper nearly twenty years ago he believed that the life of rail was determined by the joints. At that date the welded joint was new and joint design generally was in a primitive state. Since then much progress has been made in mechanical as well as welded joints, and this progress still continues. In fact, there has never been a time when the importance of keeping the track in the best possible repair was so keenly appreciated as now, when it is almost impossible to buy new rails and the old must be made to do. Broadly speaking, then, it can hardly be said in these days that rail life is determined by the joints, providing suitable joints are employed.

An Early Experimental Study of Rail Wear

First Use of Electric Weld Joints—Original Experiment Brought Down to Date—Abstract of Paper on Original Study on This Subject

By R. C. CRAM

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THE subject of rail wear and its relation to the composition of the steel in the rail has had considerable attention in the last few years, partly through the discussion which has led to the general adoption of high carbon open-hearth steel for rails and standard specifications therefor, and partly through the study of rail designs by the American Electric Railway Engineering Association. Added interest has also been created through the study of corrugation and curved-head rail design. All this recent attention to the subject of rails has led us to the belief that the study of rails and rail wear, at least as it concerns electric railways, is quite modern and up to date, but it may cause some surprise to many to learn that this subject was one of much importance to street railway men even at a time when the electric railway was in its infancy, some twenty-two years ago.

The details of what is thought to be the earliest experiment ever made to obtain data on rail wear came to light this fall when the tracks of the old Nassau Electric Railroad in South Eighth Street, Brooklyn, were opened for the purposes of overhaul and repavement. Upon examining the tracks carefully, preparatory to starting work, attention was called to a number of cast-iron boxes having removable covers and somewhat similar to boxes now used for protecting heel-tightening devices at switches. (See Figs. 1, 2 and 4.) They were attached to the outsides of the rails of one track and located at fairly regular intervals. Inquiry among those long in the track division service failed to elicit information as to their purpose, but there was an impression that they had been installed for some experimental purpose by the late Tom Johnson, who was interested in both the Nassau Company and the Johnson Company (now the Lorain Steel Company).

A sketch of the boxes was prepared and sent to the Lorain Steel Company with a request for information, with the result that the details and a very interesting report on a rail wear experiment made over the period

from 1895 to 1898 came to light again. The steel company forwarded a copy of a paper on "Rails: Their Construction from a Scientific Standpoint," by A. J. Moxham, read before the American Street Railway Association at its seventeenth annual meeting in Boston in 1898, together with blueprints of the box design and also a special steel micrometer-caliper measuring instrument (see Fig. 3) which had been made especially for the experiment by Brown & Sharpe. The accompanying correspondence indicated that the boxes had been installed as a part of the arrangements made by Mr. Moxham to obtain data relating to rail wear on special test rails, and that the data thus obtained formed the basis of the paper above mentioned.

A little later the chief engineer of the Lorain Steel Company, E. B. Entwisle, and the writer went to South Eighth Street, taking along the instrument with the intention of trying to get new measurements, but it was found impracticable to obtain them as was originally done because of the corrosion of the rail bases. The former measurements had been over-all height measurements, and it was evident that no results even reasonably accurate could now be had. However, a section of one of the rails was cut out, scribbings were made from it and impressions were taken of others. These have been plotted over drawings of the original sections.

The paper read by Mr. Moxham does not state the rail sections used, although their heights are given. Neither does it give the relative position of the rails; but the box design, checked against street conditions, indicated two of the sections and the fact that only one half-groove rail was found led to the identification of the third rail section as well as to a reasonably safe conclusion as to their relative position. The two principal sections were L. S. Co. 85-268, 7 3/16-in. and 90-206, 8 25/32-in. tram girder rail. The third section was P. S. Co. 90 1/2-222, half-groove girder. There were two of the latter originally installed while but one now remains in service.

The head wear in cross-section to date on the three sections is approximately as follows:

Section	Height	Original Head Area, Sq. In.	Amount Worn Sq. In.	Per Cent Worn
85-268.....	7 3/16 in.	1.88	0.56	29
90-206.....	8 25/32 in.	2.07	0.58	28
90 1/2-222.....	8 25/32 in.	2.05	0.56	27

The original head areas include only the areas above a line connecting the top of the tram with the under side of the back of the head, thus excluding wear on trams. The maximum vertical wear at a point 1/4 in. back from the original gage line on all three rails was found to have been substantially at the rate of 1/64 in. per year.

Accurate statements of the car traffic sustained dur-

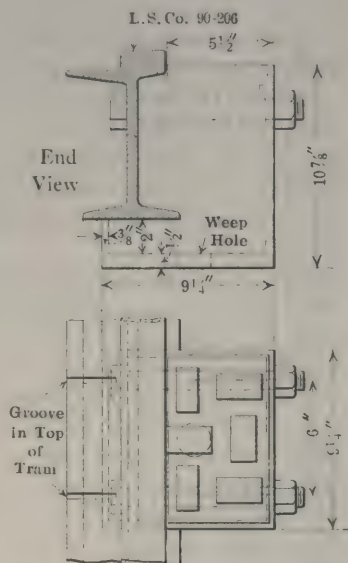


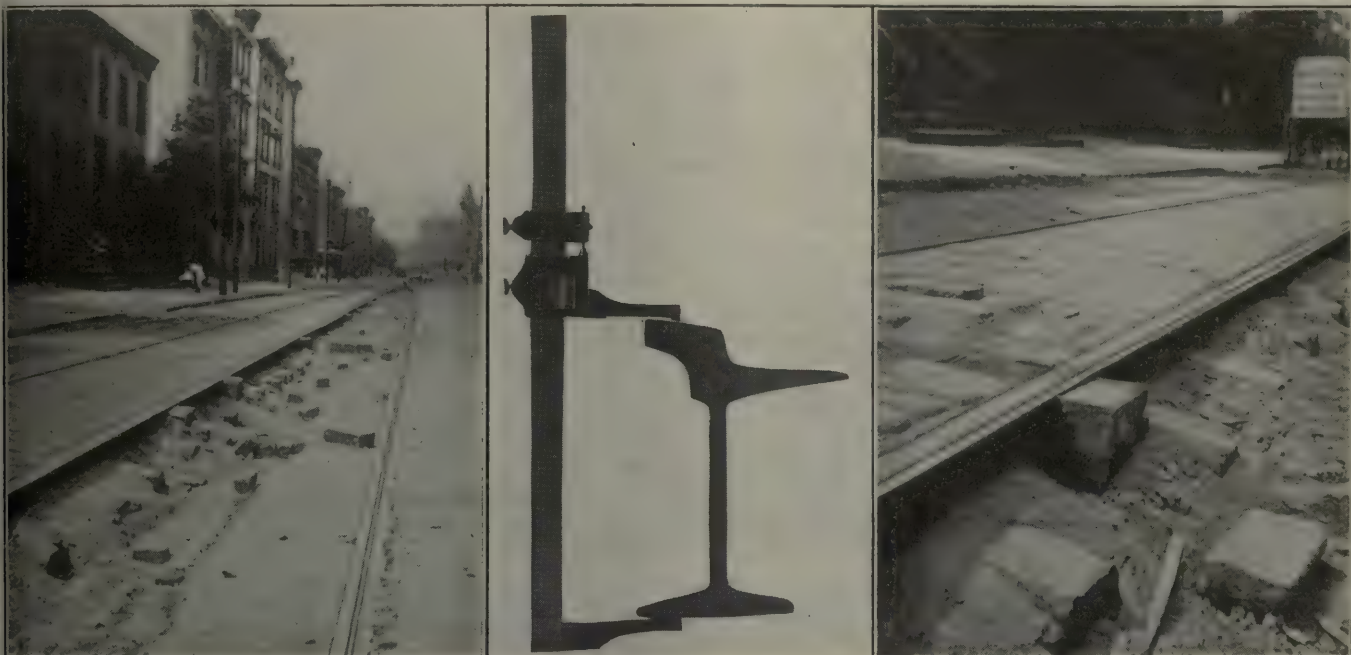
FIG. 1—DETAILS OF BOX FOR USE IN MAKING RAIL MEASUREMENTS

ing this time are not available. It is known that the two-minute headway which obtained during the three years of the experiment was probably continued until about 1904, when it became somewhat less due to re-routing of cars caused by the opening of the Williamsburg Bridge. It is estimated that at least 9,631,000 wheels have passed over each of the rails if a four-minute headway of eight-wheel cars be assumed for twenty hours per day.

It will be of interest to state that we left the 9-in. rails in place, as they should last more than five years longer. The 7-in. rails having a base originally 4 in.

Mr. Moxham's paper on "Rails" previously referred to was an important contribution to the sum of our knowledge on the subject and parts will bear repetition here, as many of his observations and conclusions then reached are quite as pertinent to-day. Following is a general description of the object of the experiment and the plan for obtaining rail-wear measurements.

The experiments have lasted for three years. The first endeavor was to take broadly a "soft" steel and a "hard" steel for the rails to be tested, securing the difference by carbon alone, leaving all other ingredients as nearly as possible the same. The experiment with these started in October, 1895, and has been continuous ever since. In



FIGS. 2 AND 4—RAIL MEASUREMENT BOXES IN PLACE; FIG. 3—MICROMETER CALIPER FOR USE IN MAKING RAIL MEASUREMENTS

wide had to be removed, not because of head wear or joint conditions, but because the base was so badly corroded, particularly on the gage side, as to prevent respiking. On that side the base was of less width than on the head side, the rails having been designed primarily for use on cable roads whose special yoke construction required the eccentric base. It is also to be noted that the 7-in. rail section 85-268 had a curved head originally.

As a matter of some historical interest it is worth recording that the tracks in South Eighth Street were found to have electrically welded joints of the "bar-weld" type which were installed by the Lorain Steel Company in 1898, three years after the rails were laid. When first put down, the regular bolted joints had been used. The steel company advises that this was the first practical application of its "bar-weld" process, using pressed steel bars having raised bosses, and that the only substantial changes since made in the process have covered the use of the new shape of bar providing head support directly at the joint and the increase of the time the bars are held under pressure from one and one-half to two minutes then used to four or five minutes now considered essential. The major portion of these joints are still good and were left undisturbed. A fair idea of their present condition may be gained from Fig. 9, on page 171.

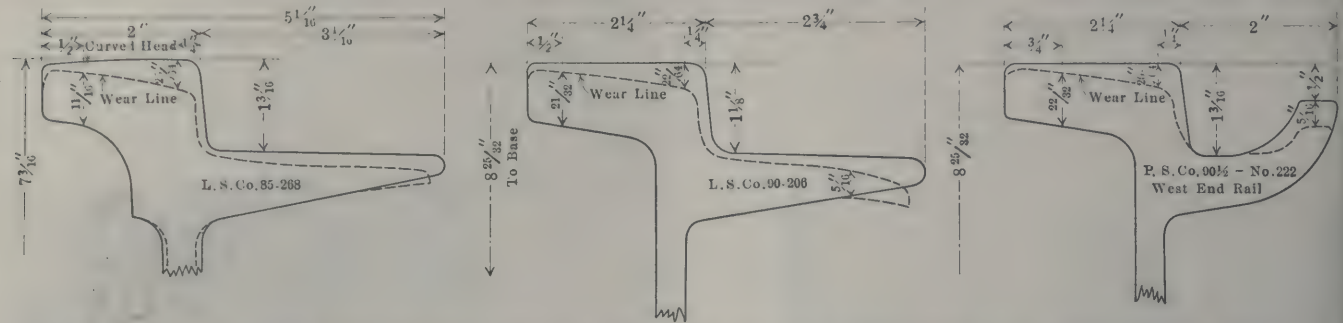
June, 1896, additional rails were added to the experiment, supplied by the West End Street Railway Company of Boston, which at that time had determined (with wisdom, as will be seen subsequently) upon a steel both hard and ductile. The conclusions, therefore, are based upon what may be termed soft, hard, and hard and ductile steels.

The rails (some thirty-three in all) were laid in the South Eighth Street tracks of the Nassau Electric Railroad of Brooklyn. They were laid continuously, so that the same car is obliged to pass over every rail, and therefore each rail is subject to the same wear, and the wear on the head only is considered. Street traffic is ignored. The point was selected as one that would give great wear in a short time, in order to reach early conclusions, as the cars pass this point at extremely short intervals.

Every rail has been measured at two points, taken about 10 ft. from each end, in order to eliminate the special wear at the joints. Each rail has two cast-iron boxes bolted to the outside, at the points to be measured, to permit access for purpose of measurement without disturbing the road-bed. Originally the wear was registered both by actual measurement and by taking an impression of the head of the rail by means of type-metal castings. Two slots were provided in the tram of the rail to guide the type-metal mold. Notwithstanding the great care that was exercised in taking the impressions, this method of measurement was quickly given up as the results were far from being as accurate as those taken by micrometer calipers. With these calipers, measurements of each rail are taken at three points across the head of the rail; No. 1 being at a point near the gage line, No. 2 being nearly in the center of the head, and No. 3 being nearer the outside of the head. Speaking accurately, No. 1 is 2 in., No. 2 is $1\frac{1}{2}$ in. and No. 3 is $\frac{3}{4}$ in., all from the outside of a head $2\frac{1}{4}$ in. wide. Methods were adopted for accurately locating the same line, so that the comparisons in the different measurements of wear are to be relied upon.

The paper then states that “soft” rails having low carbon, 0.28 per cent, and “hard” rails containing what was then considered high carbon, namely 0.59 per cent, were used, and that an effort was made in their manufacture to keep the other ingredients exactly the same so that any difference between the two classes of steel

relation of this arbitrary specific gravity to the relative wear shown in the test. . . . The analysis shows that what is needed is the densest steel.” Referring to ultimate strength in tension, he notes that this closely follows the determined wear, but that the elastic limit in tension does not, the indication being that having



FIGS. 5, 6 AND 7—TRAM AND GROOVED GIRDER RAIL SECTIONS, NEW AND AFTER MORE THAN TWENTY YEARS' WEAR

as far as chemical differences were concerned could safely be laid to the carbon. Careful comparisons were also made covering specific gravity and physical tests both in tension and compression. After the experiment had proceeded about a year, a third class of rails was added. These were furnished by the West End Street Railway of Boston and had been made to its specification. They had practically the same carbon content as the “hard” rails but with silicon considerably higher. Phosphorus was lower and manganese higher than in the “hard” rails. The object of the West End company was to combine hardness with ductility.

Table I gives the averages of the physical tests as they appear in the paper. In commenting on these

reached a given amount of hardness and consequently strength, the more ductile rail will give better wear. In commenting on the elastic limit in compression, he notes that “while it would appear that the rail compressed the least would wear longest, where the difference in compression is indicative of greater elasticity without sacrifice of ultimate strength, it is within reason to the good.”

In speaking of chemical compositions, he notes that “the greater durability of the hard rail as compared with the soft, speaks for higher carbon,” and that carbon is practically the same in the West End rail as in the hard rail, the real point of difference here being in lower phosphorus and higher manganese, it being “well known that low phosphorus accompanied by an increase in manganese conduces to greater ductility.” He then states that cost here enters due to manufacturing difficulties in lowering phosphorus in standard Bessemer steel and adds that it would cost \$2 per ton more than the \$25 per ton which was the average price for girder rails. (This is of interest at the present time in view of war prices of about \$70 per ton with no

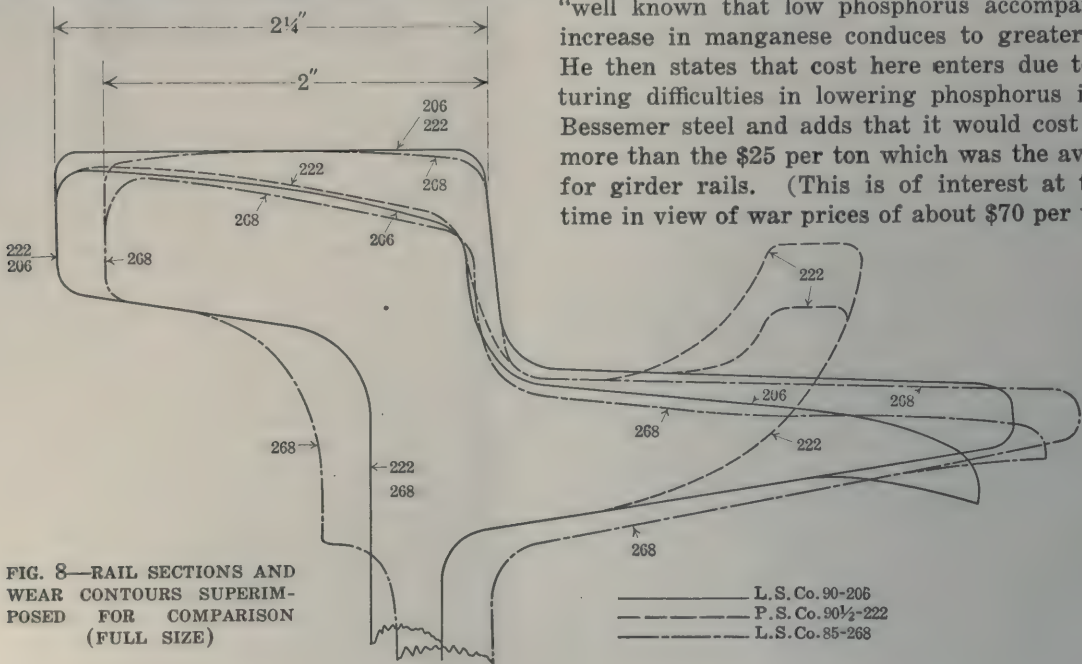


FIG. 8—RAIL SECTIONS AND WEAR CONTOURS SUPERIMPOSED FOR COMPARISON (FULL SIZE)

tests Mr. Moxham says in regard to specific gravity: “It will be found a law that where specific gravity is referred arbitrarily to the iron and the metalloids deducted, the specific gravity will tally closely with what is to be expected from the actual use of the metal, . . . and it is interesting to note the very close

delivery promise.) The low phosphorus question is now apparently well settled in present practice, due to the use of open-hearth steel, and it is also to be noted that present specifications generally ignore sulphur, probably because it runs under 0.05 per cent in basic open-hearth pig iron.

TABLE I—AVERAGES OF TESTS OF RAIL STEEL TAKEN FROM MR. MOXHAM'S PAPER OF 1898

Specific Gravity at 60 Deg. F.	Tension Test			Compression Test			Class of Steel	Specific Gravity, Iron only, deducting "Metalloids"
	Elastic Limit Lb. per Sq. in.	Ultimate Strength Lb. per Sq. in.	Elong. in 8 in.—per cent	Reduction of Area—per cent	Elastic limit— Lb. per Sq. in.	Modulus of Elasticity		
7.855	45730	75860	24.3	51.6	35,000	30,000,000	Soft	7.956
7.841	62500	118100	11.9	18.4	50,300	31,900,000	Hard	7.971
7.825	53160	121380	11.5	20.0	47,100	28,100,000	Hard & Ductile	7.977

Table II gives a comparison of the chemical analyses of the test rails as well as an analysis suggested by Mr. Moxham and the analysis now given in the American Electric Railway Engineering Association standard specification for open-hearth girder rails, Class B.

Mr. Moxham closes his paper with some quite prophetic comments upon the rail joint question and four conclusions, saying:

During later years we have heard less of this joint question, for as compared with earlier joints (of the bolted type) the track is comparatively smooth. Nevertheless, the evil still exists, and a few years from now (1898) those who are to-day deluding themselves in the belief that they have a long life for their existing tracks will awake to find out that even the construction of to-day is wasteful and extravagant in this respect. The joint which is accepted now as being passably fair is reducing the life of the rail to one-half or perhaps even one-third of what it should be.

The conclusions we are led to seem to me to be as follows: 1. That for street railway use a "hard" rail will give the best results. 2. That the most economical way to secure this hardness is by increase of carbon, accepting the manufacturers' standard specifications for the other ingredients. 3. That the next step should be toward an improvement of the joints.

As is well known, the writer has pinned his faith to the electrically welded joint as settling the question once for all by making the union homogeneous with the rail and possessing an advantage from an electrical standpoint in the matter of conductivity. Nevertheless, the cast-welded method also demands careful consideration. It is certainly preferable to anything in the nature of splice bars that we know of, provided one glaring fault can be overcome, viz., the softening of the steel that occurs from the large body of hot cast metal located at that point, and it would appear that some means could be devised to overcome this evil.

4. After making the joints perfect, what we have termed the "West End rail" would certainly justify its extra cost. As the analysis of each rail is embodied in this paper, I need not here refer to it.

The great lesson I would once more emphasize is that until you get the joints perfect you need not worry about the quality of your steel; anything in the shape of steel—the very cheapest you can buy—will last longer than the joints will permit you to keep your rails in the track.

Table III gives the average monthly wear of the test rails as reported by Mr. Moxham. It also indicates the estimated wear of the rails at the same rate for twenty-two years of service for the soft and hard rails and twenty-one years and two months for the West End rail. The actual wear as found from the scribings taken last fall have been added and the contours obtained are shown in Figs. 5, 6 and 7, while a composite

TABLE II—AVERAGES OF CHEMICAL ANALYSES FROM MR. MOXHAM'S PAPER, COMPARED WITH AM. EL. RY. ASSO. STD. CLASS B.

	Soft	Hard	Hard & Ductile	Analysis suggested by Mr. Moxham	Am. El. Ry. Asso. Std.—1913 Spec.
Carbon	0.280	0.590	0.570	0.550	0.70—0.85
Silicon	0.026	0.056	0.234	0.100 or under	0.20 not over
Phosphorus	0.106	0.097	0.050	0.080 or under	0.04 not over
Su phur	0.066	0.059	0.078	0.060 or under	Not Stated
Manganese	0.790	0.830	0.980	0.830 or over, not to exceed 1.00	0.60—0.90
Iron	1.268 98.732	1.632 98.368	1.912 98.088		
	100.000	100.000	100.000		

drawing of the three rails and wear contours appears full size in Fig. 8.

It will be noted from Table III that the actual vertical wear now found on the hard and soft rails agrees fairly well with the estimated wear at the original reported rate, but that the rate of wear on the West End rail has increased and is very close to that of the hard rail, so close that it is a question as to whether the "hard" rail has worn more than the West End if allowance is made for ten months' less service. The question also arises as to whether Mr. Moxham did not

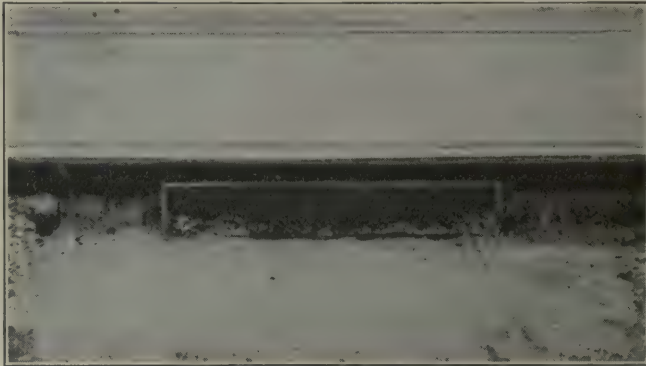


FIG. 9—BAR WELD INSTALLED IN BROOKLYN MORE THAN TWENTY YEARS AGO

overlook an important point in comparing the wear of the hard and soft rails in neglecting to account for the difference in width of heads and the curved head, the "soft" rail head being only 2 in. wide, so that the soft rail presents about 12 per cent less width of wearing surface, which in turn would no doubt increase the rate of wear through load concentration. There is some substantiation for this view also in the fact that the actual cross-section area in the head of the "soft" rail is about 9 per cent less than that of the "hard" rail. Meanwhile there seems to be no definite reason assignable to the increased rate of wear found in the West End rail, which is now worn substantially as much as the "hard" rail, if allowance be made for the difference in length of service.

The conclusions now reached as a result of the in-

TABLE III—AVERAGE MONTHLY WEAR ON TEST RAILS REPORTED BY MR. MOXHAM IN 1898 COMPARED WITH WEAR FOUND AT END OF TWENTY-TWO YEARS

Kind of Steel	Monthly Wear reported by Mr. Moxham	Length of Service	Estimated Wear at same rates	Estimated Wear at same rate, expressed in fractions	Length of Service	Approx. Wears Found	Wears found expressed in fractions	Rate per year found
	inches		inches	inches		inches	inches	
Soft	0.0017	34 Months	0.4488	$\frac{21}{47}$ —	264 Months	0.4063	$\frac{26}{64}$	$\frac{1}{4}$ in. strong
Hard	0.0012	34 Months	0.3168	$\frac{20}{63}$ +	264 Months	0.3437	$\frac{34}{100}$	$\frac{1}{4}$ in. exact.
West End	0.0007	26 Months	0.01778	$\frac{11}{64}$ +	254 Months	0.3125	$\frac{25}{80}$	$\frac{1}{4}$ in. scant.

Railways Agree on Need of Publicity

Doherty Properties Answer Questionnaire By Saying That Public Must Be Kept Informed of Conditions—Important Views on Methods and Means

THE electric railways operated by H. L. Doherty & Company, New York, N. Y., are almost unanimously of the opinion that publicity, and lots of it, is the surest way to make the public sympathize with the difficulties of electric railway operation.

This expression of opinion is the result of a recent canvas by means of a questionnaire. When it was decided last autumn that in view of the war and other conditions the annual convention of the Doherty railway department should be abandoned, a questionnaire was sent out to the managers with the idea of having the answers circulated.

The list of the questions regarding the publicity end of the business was prepared by E. R. Kelsey of the Toledo Railways & Light Company, and the answers have been compiled by R. F. Carbutt, railway engineer of the organization. The main points of the report have been printed and are now being circulated under the direction of the committee in charge, which consists of E. R. Kelsey, R. L. Baker and J. H. Van Brunt.

The properties were unanimous in the belief that a central publicity department for the Doherty traction properties would be advantageous. Furthermore, the managers believed that publicity should be handled also by local publicity departments in order to meet local requirements. Several properties were in favor of distributing pamphlets in the cars, and they also favored

(Concluded from page 171)

vestigation of this early rail wear experiment are as follows:

1. There is still some question as to the effect of the chemical composition on the wear of rails, as it is believed that the experiment as originally reported failed to account for the important factor of head width.

2. Nevertheless, it is thought that the high carbon now incorporated in the standard analyses should be maintained, notwithstanding the rather peculiar performance of the West End rails.

3. It is quite true that, while perfection of joints considered as most essential by Mr. Moxham has not been reached, there are several methods of joining rails now in use which are giving excellent results with very small percentages of failure. We are, therefore, justified in a reasonably high expenditure for a good quality of rail steel.

4. The result of this twenty-two-year-old experiment indicates a rate of vertical wear on old Bessemer steel rails of substantially 1/64 in. per year, for rails leaving a carbon content of under 0.60 per cent, with a traffic headway averaging four minutes with double-truck cars.

5. It is to be regretted that this original experiment did not include a method of measurement which would now admit of duplication with greater accuracy. Hence the results now obtained are subject to a number of factors which permit much more variation than is desirable in obtaining information of this character, and the data now reported must be considered with this in mind.

meetings and talks with employees in order to educate them in the matter of explaining things on which the patrons seek information.

In regard to the local press and its relations with the company, all answers agreed that the newspapers should be taken into the confidence of the company, and that all the newspapers should be made to feel that all the news would be given to them promptly and accurately. It was also stated that news of accidents should not be suppressed. The experience of Mr. Doherty and Mr. Coates in Toledo in regard to publicity was pointed to by many managers as being proof that complete frankness with the newspapers was the one and only way of making friends with them.

COURTESY ON PART OF EMPLOYEES IS DEEMED ESSENTIAL

Courteous employees was another point emphatically emphasized as essential to a successful publicity campaign. It was pointed out that discourtesy on the part of employees can destroy all the benefits which are gained through printed and other publicity. Commenting on the courtesy part of the problem, C. D. Flanigen of the Athens Railway & Electric Company, Athens, Ga., said: "The most effective way is to have it (courtesy) in the atmosphere like ozone, to kill automatically all germs of discourtesy."

Regarding the points about the operation of electric railways which the public should know, all the managers agreed that the most important fact which the patrons should realize is the increased cost of everything that goes into the make-up of a car ride. In this same category of publicity was included the general ignorance of the origin of the paving charge. It was pointed out that if the patrons knew that it was a relic of the old days of the horse car there would be little difficulty in having the clause taken out of franchises.

It was agreed that the best way to get this sort of information before the public was by newspaper advertising and posters in the cars, and by officers taking advantage of every opportunity to talk to clubs and civic organizations about it.

COST AND OTHER POINTS

In answer to the question, "What portion of the company's gross receipts should properly be set aside for the purpose of advertising and publicity?" the answers varied. Most of the managers said 1 per cent, but some went as high as 2 or 3 per cent.

There was a question regarding the best means of handling the advertising space sold in cars. Many believed that more revenue could be obtained by handling the advertising directly than by having it attended to by an agency. There were several suggestions that the matter could be handled best through the central advertising department at the New York office.

Among the other suggestions made were several recommendations in favor of publicity regarding the financial condition of the companies; illuminated schedules on business corners; better car marking; explicit printed directions to guide patrons, and similar items to contribute to the comfort and convenience of passengers in order that they might become entirely satisfied with the service rendered.

Light-Weight Safety Cars Best for All*

The Public, Company and Employee All Benefit from
Their Introduction—Advantages to Each Analyzed

By W. G. KAYLOR
Westinghouse Traction Brake Company

THE advent of the light-weight, quick-service safety car handled by a single operator marks a most important epoch in the development of the street railway industry. In the operation of electric railways we must recognize three factors, as follows:

1. *The Public.*—It is the community that gives the street railway its excuse for existence. It is their patronage that pays our bills.

2. *The Investor.*—It is the financier on whom we depend to furnish the capital to run our road.

3. *The Employee.*—It is the officers of the company—the clerks, the shopmen and the platform men—on whom the investor and the public alike depend to properly handle their investment and to sell their service.

To prove the success of the safety car we must show that the three parties referred to are benefited thereby.

Likewise, the corollary is true. The benefits derived from the operation of safety cars must be divided equitably among these three parties or its success will not be assured.

To the public the safety car offers more frequent and faster service and more comfortable and safer riding. Three safety cars will displace two ordinary cars and cut the weight in two, yet provide seats for 10 per cent more passengers. Equipped with modern motors and ball bearings on the axles, the safety car accelerates at $2\frac{1}{2}$ to 3 m.p.h.p.s., or faster than the average jitney can get started. Therefore, in actual competition with jitneys, the safety car gets away ahead of them, picks up the passengers at the next corner and is off again before the jitney can pass the car. As has been proved in jitney infested centers, the safety car has driven them off the street.

The fact that the safety car carries fewer passengers than the ordinary car simply means a reduction in the number of stops, thereby contributing to an increased schedule speed. For instance, if the schedule speed of the ordinary car were $8\frac{1}{2}$ m.p.h., the safety car under the same conditions would make approximately $10\frac{1}{2}$ m.p.h.—an increase of 25 per cent. The car is mounted on 24-in. wheels on an 8-ft. wheelbase. Lost motion between car body and truck has been eliminated, thereby doing away with the undesirable pendulum motion of car body under rapid acceleration and braking. Furthermore, the car body is so suspended on the trucks as to provide for a natural swing or lateral

movement when it takes curves or sidings. In addition to this there are a low step and cross seats, all of which contribute to the comfort of the riding public.

The safety of the passengers is cared for by automatic devices interlocked with the control of the car. Although the car is operated by one man, it is safer than a two-man car not equipped with these automatic devices. The standard safety car has straight air brakes with emergency feature. Any collision or other accident that breaks the air pipes will stop the car in emergency. Furthermore, the operator cannot leave his post unless the brakes are applied, and if he becomes incapacitated the brakes go into emergency. An emergency application may be obtained by the operator; first, by removing his hand from the controller handle (if the brakes are not already applied in service); second,

by removing his foot from a foot valve (used for cutting out the emergency feature in the controller when the operator wants his left hand free to make change or issue transfers without getting an emergency application) and, third, in the usual manner by the brake valve.

An emergency application not only applies the brake with full force as quickly as air can be passed direct to the brake cylinder, but it first shuts off the power and applies sand to the rail. The use of sand on a bad rail will shorten the stop by 20 per cent. At the same time the front and rear doors are unlatched, so that

they may be opened by passengers pressing against them. This is made possible by the fact that the doors are operated by air, and is one of the most important safety features of the car. Otherwise imagine the panic that would arise in case of an accident if the passengers found themselves locked in the car, as they would be if the operation of the doors were not interlocked with the control of the car.

The safe passage of cars at steam railroad grade crossings is well taken care of by the Public Service Commission of Pennsylvania in General Order No. 5, dated Feb. 4, 1914. In the absence of a conductor it provides for

"a watchman, stationed and maintained at the crossing . . . except that at crossings of electric railway tracks by railroad sidings leading to railroad yards, or to industrial plants, where by agreement between the companies operating their cars, trains and engines over the same, it is provided specifically that a brakeman, flagman or employee of the railroad company shall proceed to crossing ahead of the passage of any car, train or engine of the railroad company over said crossing and flag the crossing and warn the

The public gets more frequent and faster service and more comfortable and safer riding.

The investor gets reduced track and car maintenance, accident charges and platform expense with more riding, as well as a car which appeals to the short-haul passenger.

The employee gets a car which is easy to operate and usually an increase in wages.

*Abstract of paper prepared for Jan. 4, 1918, special meeting of Pennsylvania Street Railway Association, Harrisburg, but not read owing to delay of Mr. Kaylor's train in reaching Harrisburg.

public of the approach and passage of such railroad car, train or engine."

This means that at main-line crossings the street railway company may maintain a flagman instead of having the conductor flag the car, whereas at sidings the steam railroad will flag its own train movements.

In none of the many cities operating safety cars has the public objected to their use. On the contrary, in many ways they have evinced their approval. Whereas on a two-man car 50 per cent of the passengers ask the conductor for change, on safety cars only 10 or 15 per cent call for change. There is an explanation for this. Safety cars have no "riding" platform or reservoir capacity. As a result passengers unconsciously get their exact fare ready as they board the car.

On a two-man car passengers feel that the conductor is there for the sole purpose of collecting fares, and they are inclined to take their time about it. On the other hand, as passengers board a safety car they realize that the operator's primary duty is to run the car rather than collect fares, so they feel it is their duty not to take up any more of his time than necessary so that the car can get under way without delay. Transfers are on a rack at the side of the fare box. They are punched at the end of the run, so that no time is lost in issuing them.

The operator sits far over on the left side of the platform, thereby allowing for as much space as possible for passengers entering and leaving the car. The fact that the passengers board the car at the forward end, right at the side of the operator, enables him to "spot" his car when stopping to pick up passengers. This saves the passengers a few steps, a particularly desirable accommodation at muddy crossings. It also cuts a little time off the length of stop.

WHY THE CAR APPEALS TO THE INVESTOR

To the investor, representing the capital invested in street railways, the safety car offers unusual opportunities. A 65 per cent reduction in weight on rails means a material reduction in maintenance of track and roadway, estimated by some engineers as directly in proportion to the reduction in weight. It also means a proportionate saving in power. The saving in platform expense is more than 50 per cent, even if the operator is paid 10 per cent more in wages than he received as a motorman. This is due to the 25 per cent additional mileage made by the safety car. The maintenance of car and equipment is less—due to the reduction in number of wheels, motors, square feet of car surface to be cleaned and painted, etc.

Shorter headways and faster schedules encourage riding, as for instance, a 40 per cent increase in service has occasioned a 60 per cent increase in number of passengers. The safety car operating on a shorter headway caters to the short-haul passenger, the one that it costs the least to handle. The elimination of jitneys brought about by higher acceleration and schedule speed and more frequent service contributes largely to the increase in passenger traffic, as does also the diminution in the use of privately-owned automobiles, enhanced to some extent by war conditions. To summarize it may be said that when the cost per car-mile for operating the ordinary car is 15 cents, the cost per car-mile for the safety car is 8 cents—a saving of 7 cents. Three

cents of this represents the saving in platform expense and the balance in the economies resulting from the operation of a lighter car on a faster schedule.

To the employee, particularly the platform man, the safety car also offers unusual opportunities. A greater exercise of mentality encouraged by additional responsibility is usually rewarded by a 10 per cent increase in wages. Furthermore, the former platform man is advanced in title from a motorman or a conductor to an operator.

No man need lose his job on account of the introduction of safety cars. The change cannot be brought about rapidly enough for that. For a time, it might cause a falling off in the number of "turnovers," but during the war there is such a demand for men no objection has been raised against the safety car on account of its saving labor. On the contrary, employees like the safety car. In cities where they are being introduced there is always a long list of applications from motormen and conductors waiting to be assigned to safety-car runs.

The car is easy to operate. It is controlled by two handles, that of the controller and the brake valve. Sand may be applied in any position by pressure on the brake-valve handle. The control of the doors is also incorporated in the brake valve so that after the brake is applied the operator may open the front door by simply moving the brake-valve handle to the door-opening position. The operator is seated in a comfortable swivel chair and handles the safety car in much the same way as a chauffeur runs an automobile. The elimination of physical strains makes the operator more alert by increasing his mental efficiency. This is reflected in the reduction of accidents.

Furthermore, the ease of operation makes the safety car adaptable to the use of women operators. At this time this point is particularly worthy of consideration. As more men are called into the service, women will take their places, and it will be a long time after the war is over before they leave the various lines of endeavor that they are now entering. The economic and social fabric that is being woven by this war will not be unravelled over night.

THE CAR IS NOT AN EXPERIMENT

Safety-car service is not an experiment—it is an established institution. It was on Nov. 1, 1916, that the Summit Avenue line in Fort Worth, Tex., was changed over to safety-car operation. Since then 1000 safety cars have been placed in service or contracted for by sixty different cities of this country. Furthermore, 98 per cent of the one-man cars built in this country during the last two years have been the standard safety car. This fact alone should have an important bearing on the financing of new safety cars, as the question as to whether or not the proposed new cars are of a standard type is one of the first questions asked by the banker. Furthermore, it is just what the industry has been longing for—a standard car and equipment for electric street railway service.

The electric railway manager who says that the safety car may be all right for New Mexico or Texas but that it would never do in his town and that the people would not stand for it, has not made a thorough investigation of this subject. Furthermore, it is not a small-town

proposition. In fact, there are some lines in our largest cities that could be operated to advantage with safety cars. The only limit is track congestion. Where this exists, as it does on Manhattan Island, an attempt to operate more units would have no other effect than to slow down the schedule.

However, in the average city, where the main street only is congested, and that only because most of the car lines converge on it, the movement of cars through that street might be slowed down. But when the safety cars entered the outlying districts their higher average speed would more than compensate for the time lost on the congested street. Very often also congestion can be relieved by rerouting. Vehicular traffic also should be regulated. On some lines it is a menace to operation. Therefore, wherever possible, through co operation with the municipality, such traffic should be routed over other streets where it will not interfere with the operation of cars.

WHAT CAN BE DONE NOW?

What has been said so far may be good food for thought, but it does not offer immediate relief. Old equipment cannot be scrapped and replaced at once by safety cars. Furthermore, with the government competing with private enterprises for the use of capital, there is not much of it available for the purchase of new cars and equipment. We must conserve what we have and operate it as efficiently as possible.

Undoubtedly many existing cars could be converted into safety cars and operated advantageously by one man. If the cars are too large for one man to handle during rush hours a conductor could be employed at that time. The question then arises as to what to do with him the balance of the day. Why not employ him in the shop or office? Select the work he is best fitted for and teach him how to do it and so schedule the shop and office routine as to allot certain work to these extra men. This would certainly be conserving man power to the greatest extent and would be a material benefit to the men themselves.

On the other hand, why not consider women as conductors during rush hours? There are many of them who have the time and who are willing to work on a part-time job.

The handling of factory crowds by large cars operated by one man could readily be taken care of by the prepayment method. Arrange to have the factory employees pay their fare before they enter the car. The operator could handle the additional passengers picked up en route. A car seating thirty-two to thirty-six passengers is as large a car as can be handled properly by one man when loaded to capacity.

The safety car also readily adapts itself to the zone system of fares; in fact, it is the exponent of economy and efficiency in operation—the agent that will restore confidence in the electric railway industry.

Several subscribers have written that the leaf containing reading pages 43 and 44 was not included in their bound copies of the issue of this paper for Jan. 5, 1918. The publishers regret this omission and will supply a duplicate of this leaf to anyone whose copy is defective in this way and who will advise them of the fact. The leaf can then be inserted in its proper place.

A New Association with a Definite Purpose

Freight Agents of New England Electric Railway Properties Have Organized the New England Electric Freight Association

ON Jan. 15, in the offices of the Connecticut Company, New Haven, Conn., the recently formed New England Electric Freight Association held its second regular meeting. The principal feature of the program was the paper by V. S. Curtis, secretary and general traffic agent of the Connecticut Company, on the ruling of the Public Utilities Commission of Connecticut with regard to the rates which may be charged by the Connecticut Company for trolley express service. Mr. Curtis first abstracted the finding of the commission, a report of which was printed on page 1153 of the issue of the ELECTRIC RAILWAY JOURNAL for Dec. 29, 1917. He then explained the fundamental principles for which the company had contended, and which were agreed to by the commission. Mr. Curtis distributed samples of printed matter used in the express department of his company, as well as reprints of the descriptive article printed on page 802 of the issue of this paper for Nov. 3, 1917.

Following Mr. Curtis' address those present discussed the principles with relation to their own properties, and from the discussion it was evident that conditions differ materially with the jurisdiction under which an electric railway does trolley express and freight business. Where the jurisdiction is that of the Interstate Commerce Commission it is more difficult to differentiate between steam railroad and general express traffic and the facilities furnished by the electric railways than where the traffic is entirely intrastate. The burden of the discussion seemed to be that the value of trolley express service should be recognized by the provision of reasonable tariffs.

The New England Electric Freight Association was formed last fall for the purpose of promoting co-operation among the freight departments of the electric railways in this territory. Its membership is limited to one representative from each of the railways. The plan is to meet at frequent intervals at different railway centers in the territory, thus incidentally familiarizing the members with the facilities of each. Pursuant to this policy, an earlier meeting, largely for the purpose of organization, was held at Boston, and the third meeting will be held at Providence on Feb. 21.

At present R. E. Cosgrove, Springfield (Mass.) Street Railway, is president of the association and F. C. Lewis, Boston & Worcester Street Railway, Framingham, Mass., is secretary. The other members are C. T. Battey, Union Street Railway, New Bedford, Mass.; Leon Bolster, Connecticut Valley Street Railway, Greenfield, Mass.; V. S. Curtis, the Connecticut Company, New Haven; T. E. Leland, Bay State Street Railway, Boston, Mass.; H. R. La Montague, Worcester (Mass.) Consolidated Street Railway; A. E. Paddock, Rhode Island Company, Providence; D. C. Peck, Shore Line Electric Railway, New London, Conn.; A. Pollard, Fitchburg & Leominster Street Railway, Fitchburg, Mass.; H. B. Potter, Boston Elevated Railway, and F. E. Wood, Cumberland County Power & Light Company, Portland, Me.

Annual Meeting of Central Electric Traffic Association

Chairman Neereamer Describes the Work of the Different Committees and Calls the Year a Successful One

THE annual meeting of the Central Electric Traffic Association was held on Jan. 15, at which time A. L. Neereamer, chairman, presented his annual report, which covered the year ended Dec. 31, 1917. There was no election of officers because, under the constitution, the presiding officer of the association is the secretary of the Central Electric Railway Association. An abstract of Chairman Neereamer's report for the year follows:

ABSTRACT OF ANNUAL REPORT

Although the year just passed has been a very strenuous and busy one, yet this association has held six meetings as follows: Indianapolis, Jan. 16-18, and Feb. 20-22; Fort Wayne, April 3, May 15 and Nov. 20, and Dayton, Sept. 18. The two held at Indianapolis were for the purpose of completing the checking of the rates in Joint Passenger Tariff No. 18. The other four were regular business meetings.

There has been very little change in the membership of this association, although a slight increase. We now have fifty-one lines (members of the Central Electric Railway Association), representing 4334 miles. This is an increase of two lines and of 101 miles. Only such lines members of the Central Electric Railway Association as have furnished the chairman with power of attorney are considered members of the Traffic Association.

Joint and Local Baggage Tariff No. 9, canceling No. 8, was issued on March 28, 1917, and has had one supplement, which was issued to take in the Northern Ohio Traction & Light Company.

Joint and Local Passenger Tariff No. 17 was issued on March 29, 1917, canceling Joint and Local Passenger Tariff No. 16, and covers the Central Electric Traffic interchangeable 1000-mile ticket. This tariff is still in effect, and, like its predecessor, covers thirty-five lines, representing 3550 miles. During the year just ended 4600 of these tickets were ordered and placed in the hands of agents for selling, making a total since the inception of the mileage ticket of 43,400 tickets. At the meeting held in Fort Wayne on Nov. 20 it was decided to cancel this tariff, withdrawing the mileage ticket from the market. Before this cancellation was made, the matter was taken up by the executive committee of the Central Electric Railway Association at its meeting held in Toledo on Dec. 4, 1917, where it was decided to issue an interchangeable penny-coupon book, covering 2000 1-cent coupons to be sold for \$17.50. Your chairman is now trying to ascertain from the members just what lines desire to participate in this new publication so that an application may be filed with the various commissions asking for permission to cancel the mileage ticket tariff and replace it with a tariff of this kind. This will be done as soon as the information is received from all of the member lines.

Official Classification No. 43, covered by our I. C. C. No. 17, and effective the first part of 1916, has had four supplements issued during the year, either on special

permission or on orders of the Interstate Commerce Commission, while Official Classification No. 44, which was filed by R. N. Collyer, agent for the interurban lines, has been in effect for a year. It is to be hoped that the commission will very shortly make final decisions which will allow for the complete cancellation of this issue.

Joint Freight Tariff No. 13, covering exceptions to the official classification and issued on Aug. 1, 1916, with its two supplements, is still in effect, although the question of reissuing this publication has been up for consideration during the past year. Pending the settlement of certain applications, the committee having it in charge has been instructed to hold it until further notice.

Official Interurban Equipment Register No. 4 was issued on April 30, 1917, and covered the correct dimensions of cars of the participating carriers up to and including that date. As some of the member lines have purchased new equipment since that time it is suggested that such lines furnish the chairman with the information regarding this new equipment, so that a supplement may be issued or if necessary the tariff reissued to cover all of the changes.

Our official map committee completed its work on the revision of the map and the map was corrected during the first part of the year and a new copyright secured. There has been considerable demand for this map from all over the territory as well as from various government and state officials, and from the number of requests which the chairman has been receiving recently it would appear as if our member companies had exhausted their supply. It is to be hoped that our members will continue to distribute this map, which is one of the best advertisements put on the market by any transportation company in this or any other territory.

Joint Passenger Tariff No. 18, which canceled Joint Passenger Tariff No. 14, was issued on April 25, 1917, and has had one supplement, which was issued at the request of the Interstate Commerce Commission. We now have pending with that commission two applications to supplement this tariff, and the necessary supplements will be issued just as soon as permission is granted. Owing to the recent increases in rates granted the Ohio lines and the various applications for increases which are now pending in Indiana and Ohio, it will be but a short time when this publication will have to be reissued.

Joint and Local Demurrage Tariff No. 3, issued on Aug. 10, 1916, has had five supplements issued to it, not including the one supplement issued to cover Indiana conditions. There is now in the hands of our committee on demurrage and storage the question of issuing another supplement to conform with the recent regulations put in effect by the steam railroads. Owing to a number of changes that have been made in the demurrage rates, the chairman would not recommend the reissuing of this tariff until matters have settled down and some permanent basis agreed upon.

The attention of the association is called particularly to the work of two of our committees during the past year. One was a committee appointed for conference with the Central Freight and Central Passenger Associations. The other was a committee on military traffic. These two committees have accom-

Economics of Hydroelectric Power Development*

The Author Compares the Status of Water Power and Steam Power, Showing How the Former Is Handicapped In Its Competition with the Latter Both Economically and by Virtue of Statute

By CALVERT TOWNLEY

Assistant to the President Westinghouse Electric & Manufacturing Company, New York City

THE introduction of electricity as a means for transmitting power over considerable distances and its subsequent rapid development completely changed the status of hydraulic power. Previously such power could only be used near falling water. Now it is commercially available in convenient form within a radius, in some instances, up to 200 miles.

Along with improvements in the art of electrical transmission have come equally rapid developments in the application of electricity. Electric light has become almost the universal illuminant. Electric motors largely drive our factories and propel all our street cars. They have made substantial progress in replacing steam locomotives on some large railroads.

In an endeavor to supply the demand for electric current thus created large central generating stations have been established in or near all large centers of population.

LIMITATIONS OF WATER POWER

In the light of the foregoing, it might seem reasonable to suppose that a large proportion of the modern demand for electric current would be supplied from the energy in falling water. Such, however, is not the case. It has been estimated by a careful engineer that in 1911 there were over 26,000,000 steam engine horsepower capacity in use, including railroad locomotives, in the United States. The aggregate water horsepower developed and undeveloped has been computed as around 60,000,000. Of this latter the United States Census of 1912 gives 4,870,000 as developed, and in a report of January, 1916, the Secretary of Agriculture estimates

this total to have been increased to 6,500,000. Making liberal allowances for correction in these several figures it seems probable that there is in service from four to five times as much steam as water horsepower and that there is still undeveloped water horsepower equal to at least twice that of all the steam capacity in service.

There are two fundamental causes which have militated against the substitution of hydroelectric for steam-electric power. One is economic and permanent; the other is statutory and therefore subject to modification. Both reasons apply to some powers but neither, fortunately, to all. The economic and permanent reason is high cost of development due to natural conditions. Electric power generated by falling water is inferior to that generated by steam in every particular except cost and, therefore, water-driven service must be cheaper than steam-driven in order to justify its existence. The price for service depends primarily on cost, and cost divides itself naturally into two main items, namely, operation (including maintenance) and fixed charges. As a hydroelectric plant consumes no fuel its operating cost is less than that of an equivalent steam-driven plant. On the other hand, a steam plant costs usually only from one-fifth to one-half as much per unit of capacity as a hydroelectric plant, so that the latter must carry very much heavier fixed charges. Therefore, when steam is to be the motive power, only such capacity is installed as initial demands require and the cost per unit is fairly proportional to that of the ultimate development. On the contrary, in a water development, a large part of the cost is for riparian rights, for the dam, impounding reservoir, flume, forebay, etc., and for the transmission right-of-way, towers, etc., which must be largely provided and constructed at the start for the complete installation. The obvious result is a greater fixed charge per unit of capacity and a higher cost per horsepower delivered for sale.

(Concluded from page 176)

plished a great deal of good for the member lines of this association, a large part of which can be termed an intangible benefit, and the results are the attainment of certain progressive policies for which the association has been working a number of years.

This has been a very successful year, and, while the Central Electric Railway Association and the Central Electric Railway Accountants' Association have held no meetings other than the annual meeting of the Railway Association in March, this association has worked in unity and has been the means of keeping together the interurban lines in this territory. A large percentage of the credit for this work is due to the untiring efforts of the members of various committees to whom have been referred matters of vital importance to the lines in this territory. In conclusion the chairman desires to extend to all of the committees and to the members, both individually and collectively, his sincere thanks for the hearty support and co-operation given during the year passed.

SITUATION NOT SERIOUSLY AFFECTED BY RISE IN COST OF COAL

It has been frequently pointed out that as the nation's coal supply is depleted the cost of coal must rise, thus increasing the cost of steam-electric power as a competitor and raising the market value of hydroelectric power accordingly. The rising price of coal is a matter of record, but it is not so generally known that the improved efficiency of steam-producing machinery (boilers, engines, generators and auxiliaries) has more than kept pace, so that the net cost of producing electric power from coal has steadily declined. As applied

*Abstract of a statement submitted on Jan. 14, 1918, to a special committee of the United States Chamber of Commerce on behalf of the Engineering Council, by whose executive committee it was duly approved.

to the pre-war period it may be stated that over a period of ten years the cost of coal has risen on an average 1 per cent per year while the cost of electric power produced from coal has fallen on an average $2\frac{1}{2}$ per cent per year. It is a reasonable assumption that further advances in the art will cut down both the fixed charges and the operating cost of steam power as a competitor of water. The cost of a steam-electric plant per unit of capacity just before the war was about one-third what it was fifteen years previous, while the energy it produces per pound of coal had increased 50 per cent.

Many sites which fifteen years ago might have been developed to sell energy in successful competition with steam at its then cost could not now be so developed, and in consequence their development is no longer commercially possible. The cost of producing power from either water or steam is a function of load. Fixed charges remain practically unchanged in both instances whether the output in energy be large or small, but with a steam plant increased output means increased fuel consumption, while a water plant operates either with or without load with but little variation in expense. To illustrate: assume a steam plant using $2\frac{1}{2}$ lb. of coal per kilowatt-hour at a price of \$3 per short ton and having a plant or output factor of 35 per cent—that is to say, an output equal to 35 per cent of its theoretical output if every unit were loaded to capacity twenty-four hours each day of the year. Under these assumptions the cost of fuel per unit of installed capacity per year would be \$11.50, and if the other operating and maintenance charges be assumed to fairly offset those of a water installation of equivalent size \$11.50 represents the additional fixed charges which the hydroelectric plant could carry and produce power at an equal cost. If the fixed charges (interest, taxes, insurance and amortization) total $11\frac{1}{2}$ per cent, therefore, the hydroelectric investment per kilowatt capacity could exceed that of steam by \$100. Many hydroelectric developments exceed the cost of equivalent steam-driven systems by much greater amounts.

WATER POWER IS HANDICAPPED IN COMPETITION WITH STEAM

Further, as has been previously stated, hydroelectric power is inferior to steam-electric power. The reasons are elementary. Stream flow is subject to seasonal variation, and therefore to complete or partial interruption by drought in summer and by ice in winter. Floods are a menace. Long transmission lines may break from wind or sleet or the service be disarranged by lightning. The losses on such lines vary with load and are frequently responsible for annoying pressure variations. On account of these and other reasons hydroelectric power cannot prevail against steam competition at the same or a slightly lower price. It must be materially lower.

We do not mean to imply that water power may not be a commercially practicable competitor of steam. We do wish, however, most emphatically to combat the widely held but mistaken view that any water-driven plant will produce power at lower cost than steam can and that the margin is so large that investors generally are eagerly seeking a chance to put money into hydroelectric projects.

The second condition which vitally affects development is statutory. After ten years or more of discussion it has come to be generally agreed that our federal laws discourage the development of a large proportion of the nation's water powers, and remedial legislation has been considered at every session of Congress for many years. The legal obstacles are quite distinct and separate from the economic facts which have been previously described and are in addition thereto.

Of the estimated 55,000,000 undeveloped water horsepower in the entire country, approximately 40,000,000 is located within the boundaries of the thirteen so-called Western water-power states. In order to develop power in that section it is nearly always necessary to use some part of the public domain, if not for the dam site itself, at least for flowage, for transmission right-of-way or for some other purpose. Existing law forbids such use except under permit issued by the Secretary of the Interior and revocable without cause, at any time, by himself or his successor in office. As funds for hydroelectric development must come from private sources, the unstable tenure imposed by this condition has constituted so great a hazard of loss that the private investor has been loath to assume it. The unfortunate—almost disastrous—result has been practical stagnation in water-power development for many years. Many available power sites not in the Western states, or not on the public domain, are on navigable streams. For each such project a special act of Congress is necessary.

ENCOURAGEMENT OF WATER-POWER DEVELOPMENT

The Engineering Council does not consider itself expert in legal matters and will not undertake to discuss the relative merits of the different plans proposed to improve conditions. It should be pointed out, however, that a hydroelectric enterprise being once successfully established, it is alike to the interest of the owners, of the government and of the public that it should continue indefinitely without interruption. Further, there will never come a time when it may be said to have been completed and subject to no further expansion. This continuing growth makes burdensome and usually abortive any attempt to amortize the investment, while the investment in other water powers or in steam plants or both, interconnected with, and generally dependent for their economic operation on, the original development renders the right of the government to recapture that development only very onerous and one which constitutes a serious impediment to the free and full development of an enterprise which is otherwise most desirable from all standpoints. With respect to power sites on the public domain and on navigable streams the government is in the position of seeking to have its resources developed without assuming any business hazard and without contributing either capital or credit. It would be unfortunate, in the light of past experience, if any new laws which may be enacted should put the government in the position of bargaining with capital and of offering just sufficient incentive not to induce capital to undertake the developments desired, thereby, while apparently providing a remedy, in reality assuring a continuance of the present undesirable condition. Hydroelectric enterprises must compete with the demands of other industries for capital.

Philadelphia Partnership Plan Shows Foresight

New Contract for Unified Operation of City High-Speed Lines and P. R. T. System Provides for 5 Per Cent Return on Stock, Protected by Adjustable Fare—Places Company and City Investments Side by Side—Recognizes Authority of State Commission

The lease which has just been approved by the city of Philadelphia for the operation of new city-owned rapid transit lines by the Philadelphia Rapid Transit Company is worthy of notice not only because it is an important addition to the list of partnership agreements in this country but also because it has several decidedly novel features. The novelty lies not so much in mere details as in the various fundamentals of the new contract. The lease definitely recognizes these three principles: 1. Such unified service as the people desire should be furnished at a minimum cost. 2. The cost of this service should be met by the car riders. 3. The authority of the Public Service Commission to regulate service and fares should be fully recognized.

After two years of negotiation the new lease was approved by Councils and signed by the Mayor on Jan. 3. The only steps now remaining to be taken are the approval by the company's stockholders, who are to vote on the matter at a special meeting on Feb. 8, and approval by the Public Service Commission. The course of the negotiations and the various changes and different proposals made have been described in the *ELECTRIC RAILWAY JOURNAL* from time to time, and the present article will discuss only the main points of the latest and approved contract.

The lease contemplates the unified operation of the new city-owned rapid transit lines and the system of

the Philadelphia Rapid Transit Company. The city lines, authorized by Councils on July 20, 1916, include the Broad Street subway with branches, the Frankford elevated line, the Thirty-fifth Ward-Bustleton and Byberry surface line, the Darby elevated line, the Parkway-Northwest subway-elevated line and the delivery loop subway. The city system at present also includes the Chestnut Street subway, approved on April 2, 1917.

The company agrees to provide such additions to its system within Philadelphia as the Public Service Commission upon recommendation of the Supervising Board, later described, shall determine to be reasonable and necessary. The company waives any objection to the jurisdiction of the commission to issue orders in such matters, and it agrees to obey any such order in the premises, or if the commission refuses to take jurisdiction, it will obey the recommendation of the Supervising Board and construct or procure the new property, subject only to its ability to sell securities upon terms approved by Councils.

It is anticipated that for several years the gross revenue of the unified system, with the exception of a comparatively small amount from the Frankford line, will be secured from the company's system. Even throughout the entire term of the contract, unless the city extends its system far beyond the lines now authorized, the greater part of the gross revenue will come from the operation of the company's system. It is estimated that the city's high-speed lines, as planned, will earn not more than 25 per cent of the gross earnings of the unified system.

The lease provides that the company, for the city-owned lines, shall furnish low-tension feeders, high-tension cables and other necessary appurtenances, power stations, telephones, lighting fixtures and wiring, station equipment and such shop tools, machinery and other miscellaneous items as may be specified by the Supervising Board. The city can supply facilities at the company's expense if the latter causes any delay. Furthermore, at the request of the city with the approval of Councils, the company may be required to furnish storage yards, shops, carhouses and real estate necessary therefor, and rolling stock for any individual operating section except the first section of the Frankford line, to the extent that the city is unable to complete such equipment owing to its lack of borrowing capacity at the time.

It is provided, however, that the company shall do this if it can secure the money upon terms to be approved by Councils, and that the city shall, if it can legally do so, agree to purchase such equipment at cost out of the first money it can borrow for transit facilities. The company's investment under this provision is limited to \$3,000,000 for any one individual operating section, it being necessary to retire the investment in any one section before the company can be called upon

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Experience has shown that even without the imposition of additional financial burdens many of them are not sufficiently attractive to secure development, and as the attractive prospects grade by imperceptible degrees into the unattractive ones, it is perhaps self-evident that every additional burden, however small, transfers a percentage of such projects from commercial into uncommercial prospects.

It is our belief that the benefits afforded the communities served by cheap power, and to the nation by the conservation of coal resulting from the substitution of a self-renewing for a non-renewable natural resource are far more valuable than is the exact solution of the question of restricting the returns to capital to their irreducible minimum. The present emergency due to the progress of the war has forcibly illustrated the importance of having developed the greatest possible number of water powers as a source of industrial power supply. As it consumes no fuel, the substitution of water for steam power would release to other uses all the extensive railroad and water facilities now engaged in transporting coal. It would similarly release a corresponding volume of labor now occupied in mining this coal and in operating such transportation agencies as well and the boiler room forces of the steam-power plants themselves.

to furnish facilities in this manner for a subsequent section.

The method of procuring capital to meet the requirements for the expansion of the company's system, for refunding and other capital expenditures and for the transit facilities to be furnished to the city, the rate of interest or dividend and the program of amortization or retirement must be approved by Councils.

HOW GROSS REVENUE WILL BE USED

The gross revenue of the unified system will consist of the revenue from transportation and the revenue from operations other than transportation, including income from securities of underlying companies and all direct or indirect income from the operation of the system. Reports certified by the Supervising Board must be delivered to the City Controller for each quarter of the calendar year.

In outlining the disposition of the gross revenue, the lease provides for eight deductions, payment being in the order of the items. The first six items include (1) all expenses for operation and maintenance; (2) taxes; (3) existing fixed charges of the company; (4) interest, dividends and sinking fund payments on new securities of the company; (5) payments to the various depreciation reserve funds, and (6) payments to the city under the 1907 contract.

The balance is called the current net revenue, out of which items 7 and 8 must be paid, as follows:

"7. Payments to the city and the company in proportion to the relative investment of each equal to a return of 5 per cent per annum on such investment.

"8. Payment to the city equal to the difference between the payment to the city under item 7 and the gross amount of interest and sinking fund charges upon the city's investment."

The company's investment is fixed at the par value of its capital stock now authorized and issued, \$30,000,000, less any instalments remaining unpaid. The city's investment is to be computed under explicit provisions. The return on the investment in any individual operating section is not chargeable against current net revenue until one year from the date after operation begins.

PAYMENTS ARE TO BE CUMULATIVE

The payments under the various items are cumulative in the order of the items, except that a deficit in former years under item 7—the 5 per cent return on the investments of the city and the company—must be made up before a deficit under the preceding item, covering payments made to the city under the 1907 contract. It is important to note, however, that a deficit under an item does not occur until after the application of all the current gross revenue, all the new surplus and \$2,000,000 of the initial surplus.

HOW THE INITIAL SURPLUS AND NEW SURPLUS WILL BE USED

The "initial surplus" is the accumulated surplus of the company when the contract becomes effective. When payments under all the eight items referred to above are made, any surplus remaining is called "new surplus." The accumulation of the new surplus is made in order to provide an equalizing fund for stabilizing fares and assuring future payments as provided.

The disposition of these surplus funds is provided as follows:

"If, in any year, the gross revenue shall not be sufficient to provide in full for all the deductions and payments specified, the new surplus shall be applied to the deficit in the order of the items and to the extent it may be necessary to make full payments thereof, and thereafter the company's available initial surplus to the extent of \$2,000,000 shall be applied to any remaining deficit in the same manner."

It is, however, stipulated that in the case of the destruction of or serious damage to a substantial part of the unified system, or a continuous interruption of normal operation resulting in suspension or curtailment of payments under the last four items in the schedule, the company shall not be required to make use of the initial surplus if this has been depleted \$500,000 or more and not restored. Nor shall the company at any time be required to make up any deficits occasioned by any of the above-mentioned causes by payments from initial surplus which will cause the total depletion of this to exceed \$500,000. The lease provides that it shall not be incumbent upon the Supervising Board to file a schedule of fares to make up for such deficits, and these shall not be made up unless the board shall sanction payments on their account out of after-acquired new surplus resulting from normal and reasonable fares.

In respect to the two surplus funds two points should be noted:

1. Neither the initial nor the new surplus can ever be used by the company in payment of any dividends in excess of 5 per cent per annum from the date on which the contract becomes effective.

2. The new surplus accumulated under the contract can never be much in excess of \$2,000,000, because when it reaches that sum fares are adjusted downward.

RATE OF FARE IS FLEXIBLE

The new lease provides for an adjustable fare. The initial fare is 5 cents, with universal free transfers. The company is not obliged to issue a transfer on a transfer on the surface lines, except where the use of a high-speed line intervenes. The 3-cent exchange tickets are to be abolished outside the delivery district around the City Hall within sixty days of the effective date of the contract and inside of this district on the initial operation of the first section of the Frankford line.

It is expressly stated in the contract that the understanding of the parties in the making of the agreement is that "the fares shall be such as will provide current net revenue sufficient for a cumulative return of 5 per cent upon the company's capital stock and 5 per cent upon the city's investment, and the cumulative payments under item 8."

The lease stipulates that in case at any time there is a shortage of current net revenue for the designated payments and the new surplus is exhausted and the initial surplus depleted to the extent of \$500,000, there shall be such a revision of fares upwards as will produce gross revenue sufficient to meet all requirements and make up within a reasonable time the initial surplus and any deficit in payments of various items in former years.

Within thirty days after the initial surplus at any

time has been depleted to the extent of \$500,000, the Supervising Board is required to prepare and file with the Public Service Commission a schedule of "fares and charges," which, in its opinion, will produce the necessary amount of gross revenue.

Whenever the result of operation for two successive quarterly periods under any new schedule revising fares upward fails to produce sufficient gross revenue to meet all requirements and a surplus over and above the current payments of items 1 to 8 inclusive at such rate as will make up within a reasonable time the initial surplus and any shortage in payments of various items in former years; or, whenever at any time after the initial surplus has been restored it becomes again depleted to the extent of \$500,000 in making up current payments, the Supervising Board must within thirty days prepare and file with the commission a new schedule of fares and charges effective within thirty days.

Furthermore, should the results for any year during which there has been added any individual operating section indicate to the board that the existing schedule of fares will not produce sufficient revenue to meet the requirements when the cost of this individual operating section is entitled to a return under the lease, the board may in anticipation file a new schedule of fares and charges to take effect on the date when such cost will be entitled to a return.

There is one contingency under which the company may withhold payments under the 1907 contract to the extent necessary to pay the city's interest and sinking fund charges and the company's dividends. If the Supervising Board files a schedule increasing fares under the public service company law, the fares go into effect in thirty days. If for any reason the new fares do not become effective within this period or are suspended, the company may, until rates are effective sufficient to meet the requirements, suspend its current payments to the city under the 1907 contract to such an extent as may be necessary to make the net revenue sufficient to meet the current payments under items 5, 7 and 8.

REVISION OF FARES DOWNWARD

Under the lease the fares must be revised downward whenever the reports for two consecutive years show a surplus increasing in a substantial amount annually and equalling or exceeding at the time \$2,000,000.

The change of fare is to be effected in this manner. The Supervising Board must, within thirty days after the amount of the new surplus and the increasing tendency have been shown by the reports, prepare and file with the commission a schedule of fares and charges which will reduce the gross revenue. This must be done, however, without impairing the ability of the company to meet the first eight items out of the current gross revenue after the application to the items in each year of not exceeding one-third of the new surplus accumulated at the time of the filing of the schedule. Any schedule so filed shall take effect within thirty days.

It is possible, however, for the city to reduce its rental for the high-speed lines and thus bring about a reduction in the fare. The rental payable to the city is the amount of the interest and sinking fund charges on the bonds issued to acquire its transit facilities. The city reserves the right to determine "what portion

of the interest and sinking fund charges on its investment in transit facilities shall be borne by the car rider and what portion shall be borne by the taxpayer," and it may from time to time by ordinance specify that "any or all of the city's investment in the transit facilities shall be withdrawn from the rental requirements under the contract." If the city thus withdraws any portion and the results of operation in the preceding year indicate to the board that the existing schedule of fares will produce more revenue than necessary, the board must prepare and file a schedule of fares and charges to reduce the gross revenue accordingly, though not below the point necessary to meet the other requirements.

DEPRECIATION RESERVE FUNDS AUTHORIZED

The lease provides for three separate depreciation reserve funds to be set aside out of gross revenue quarterly in amounts and according to a classification to be determined from time to time by the Supervising Board. These funds are for: (1) The city's transit facilities; (2) the transit facilities furnished by the company for the city, and (3) the company's system.

The company's present reserve is to be funded, if not so now, for the last one. The first payment into that portion of Fund 1 which shall be set aside for permanent structures of the city's system is to be made ten years after the date upon which such facilities are first operated, and at no time is the annual appropriation to this portion of the fund to exceed one-half of 1 per cent of the cost. The first two funds will be in the control of the board, the latter in the custody of the company. Investment of funds not currently needed is subject to the approval of the board.

RIGHT OF RECAPTURE RESERVED

The new lease will expire on July 1, 1957. Upon six months' notice the contract can be renewed for successive periods of ten years. After July 1, 1927, however, the city may upon six months' notice recapture its own property and acquire all of the company's property by paying to the company a sum equal to the amount paid in upon its outstanding capital stock, the dividends on new capital stock unpaid and the accumulated unpaid portion of the protected 5 per cent dividend, and by assuming all due and accruing current liabilities of the company.

If the city dissolves the unified system at the expiration of the lease in 1957, it must pay to the company the original cost of the facilities furnished by the latter, less any repaid or amortized amounts. Under this condition the initial surplus would be retained by the company and the new surplus would be prorated according to the respective investments in the unified system.

ORGANIZATION OF THE SUPERVISING BOARD

The unified system is to be under the control of a Supervising Board, consisting of three members. The city's representative is the director of the Department of City Transit. The company's representative may be appointed from time to time and be removed at the option of the company. The chairman of the board is to be appointed for four years by the Mayor and the president of the company. He can be removed at any time by joint action of these two officers.

If the Mayor and the president fail to agree upon a

Electric Railways Co-operate in Carrying Out Garfield Order

Telegraphic Reports as to Its Effect in a Number of Cities Are Reproduced Below

THE ELECTRIC RAILWAY JOURNAL arranged to receive by wire reports from a number of cities as to the effects upon the electric railways of the order of the United States Fuel Administrator restricting the consumption of fuel. These cities were selected on account of their relation to manufacturing or shipping activities, and it was not the intention to cover the country systematically. Abstracts of the telegrams received are given below, and information received directly from companies operating in New York City is included:

Boston, Mass.

On Friday, Jan. 18, the revenue of the Boston Elevated Railway was less than on normal Fridays, service being in about the usual volume. The Thursday and Friday power station load curves overlapped and there was no difference in coal consumption apparently due to industrial curtailment. On Monday a typical Sunday schedule was at first operated, but curtailment of suburban steam railroad service overburdened the lines on the west side of the city. This with heavy traffic caused by the theater patronage, all day and evening, forced considerable increase in service. This had the approval of Fuel Administrator Storrow, who gave electric railway managers throughout the State much latitude in carrying out the spirit of the Garfield order. It is doubtful if the company was able to save coal in view of the above-mentioned circumstances and of the exemption of many establishments. Employees were paid full wages, not a man losing compensation through curtailment.

The Bay State Street Railway furnished regular weekday service on Friday, Saturday and Tuesday with extra cars and some regular cars cut out on account of the closing of certain factories. On Monday a Sunday sched-

ule was operated on about two-thirds of the system. The saving in fuel is difficult to determine on account of the variation in the quality of coal. Thus on two recent days with the same service the consumption was 220 and 170 tons respectively. On one day ten boilers were required for the normal work of six.

Trenton, N. J.

The first Monday under the Garfield fuel order caused a serious congestion on the trolley lines in and near this city. More passengers were carried than on days when the usual number of cars are in service. The Trenton & Mercer County Traction Corporation established a Sunday service for that day and operated with 30 per cent fewer cars. Seventeen trailers and thirteen regular cars were taken from the service. The New Jersey & Pennsylvania Traction Company, which runs fewer cars in winter, only removed one car from the Morrisville, Pa., line. The Public Service Railroad Company curtailed service on the Trenton-Newark and Trenton-Camden divisions. On account of a shutdown of all the plants and the keeping open of the theaters the traffic was greatly increased and the electric railway companies had difficulty in handling the crowds during the afternoon and early evening. For that day the Trenton & Mercer County Traction Corporation adopted a new method of collecting fares and saving time in loading the cars. Some of the passengers were allowed to enter by the front door and the motormen, who were provided with change, collected the fares and later turned them over to the conductors. There was considerable discomfort in riding in the congested cars.

Louisville, Ky.

A normal Sunday mileage served fairly well to meet all the demands on the Louisville Railway on Monday. Several large industrial plants continued in operation but were taken care of, Sunday headway being established on week-

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chairman, the duties of the board are to be performed by the two members. In case any question arises on which they differ, they may agree upon a temporary arbitrator. If they fail to agree, either may, on five days' notice to the other, apply to the commission, which shall then make the appointment.

The board has a supervisory power over the service of the company. This power is conferred as follows: "To pass upon, adopt and alter, from time to time as may be necessary, rules and standards as to maintenance, service, routing, adequacy and suitability of equipment as in its opinion may be necessary or appropriate for securing to the people the best practicable transportation service." The board also has the power to approve power contracts and contracts for advertising privileges, and it may establish and change stations and stopping points. It has the power to approve plans and specifications and to inspect work and materials. It cannot, however, alter or postpone the construction of any line authorized by vote of the people or by Councils. Under the lease, it may be added, the company, under such restrictions as the city may impose,

may carry or be required to carry freight, mail, express and other unobjectionable matter, provided this does not interfere with passenger transportation.

It is provided that the company has a right of appeal to the Public Service Commission from orders of the Supervising Board, but it must obey the order of the board pending the appeal. The board has no power which is vested by law in the director of the Department of City Transit or the Public Service Commission. This is clearly set forth in the following language:

"Nothing in this article shall deprive the company's officers and directors from the management of the property, nor shall anything herein be deemed a delegation to the board of any power vested by law in the director or the commission. It is the intention of this contract to enable rules and regulations for governing maintenance and service to be made and complaints and petitions of patrons to be heard more expeditiously than by original application to the commission; but nothing herein shall prevent any person from bringing before the commission in the first instance any matter within its jurisdiction."

day time. Between 6 and 8 a. m. Sunday service was increased by extra cars with normal service to noon, and a curtailed Sunday service until 5.30, with a supplemented service for the next half hour. After 6 o'clock the normal Sunday time was observed.

People generally appear to have remained at home, although there was some crowding in the early afternoon. Public schools were dismissed for the week on account of weather and fuel conditions, and this traffic was lacking. Theater-going crowds were comparable to Sunday afternoon crowds. Monday morning saw new zero temperature which tended further to keep people at home, and receipts showed 5 per cent reduction from Sunday, Jan. 20.

St. Louis, Mo., and East St. Louis, Ill.

Electric railways in St. Louis were not much affected by the Garfield order. They operated on regular schedule, as there was not a 5-day suspension of business on the west side of the Mississippi River. However, as the State Fuel Administrator does not allow business to begin before 7 a. m. nor to continue after 7 p. m. the traffic before and after these hours is very light. The East St. Louis & Suburban was ordered to operate on a Sunday schedule. General Manager Parsons on Tuesday wired G. E. Williams, Illinois State Fuel Administrator at Chicago, that while the railway company was in accord with the order it must operate its service to accommodate workmen to and from exempted plants, such as packing houses and mines. For that reason regular daily service was necessary. He asked permission to do this and Mr. Williams replied that Mr. Parsons must use his own best judgment and give the service required. Owing to snowstorms and zero weather that prevailed many cars of this company were out of service, but with moderating weather they are now operating better.

Chicago, Ill.

In this city the several roads were affected in a similar manner as follows: The elevated roads ran a normal schedule on all days except Monday, and a holiday schedule on this day with provision for small peaks. The Monday traffic was greater than that of a normal Sunday, which is about 60 per cent of a usual week day. The surface lines started on Monday on a holiday schedule but had to add cars due to an unexpected demand. This will be rectified next Monday. The Chicago & North Shore ran a holiday schedule on Monday, with normal service other days. The Chicago & West Towns reduced service on Monday to slightly less than Sunday schedule and could have used more cars to advantage at some points.

Indianapolis, Ind.

Owing to unprecedented snowstorms and extreme cold during the past two weeks all street railway travel in this city has been below normal. Approximately regular Sunday schedules were operated on Monday except that extra cars were used morning and night to take care of employees of some factories working on government orders. Travel during the day was about equal to usual Sunday travel under similar weather conditions. The extreme cold weather and the closing of all theaters, picture shows, saloons, etc., for several days last week by the local fuel administrator has tended to keep the people at home.

Cleveland, Ohio.

The Cleveland Railway operated under definite order from the Fuel Administration to maintain Sunday schedules only on Monday and it obeyed the order explicitly. However, forty large manufacturing industries were exempted from the closing order without notice to the railway and thousands of workmen found it impossible to board cars in the morning. They were left standing at the corners, and eventually they reached their places of employment. They found the same conditions on the return trip in the evening, as additional cars could not be furnished. In addition thousands of men went to cold offices to look over their mail and others took advantage of the opportunity to visit, thus putting up to the railway a burden that was not expected. Big crowds gathered at every important stop, and in some instances crews were threatened when they passed the stops with cars already heavily loaded. In one place the trolley wheel was pulled from

the wire in an attempt to prevent a car from proceeding. All theaters did a big business but the people found no extra cars to carry them home in the evening. The crowds were fairly well cleared by 6.30 p. m. with the regular cars, since the Sunday schedule provides for many more cars in the afternoon than in the morning. The use of this schedule resulted in confusion in many places and railway officials had their hands full in taking care of the work. The company has received permission to furnish a sufficient number of cars next Monday in addition to regular cars to carry workmen to and from exempted factories.

Buffalo, N. Y.

With the exception of providing usual tripper extras for more than 35,000 employees of war industries exempted by the Garfield order the International Railway maintained a curtailed week-day schedule of cars on all local lines on Monday. The interurban schedule on the Niagara Falls, Lockport, Olcott and Lancaster divisions remained unchanged. About 85 per cent of the regular week-day service of regular runs was given, but no tripper extras were sent from the carhouses for the usual evening rush period. Almost a score of the largest industries which are working almost exclusively on government orders worked full time, and there was no change in the service provided for these employees. The Buffalo & Lake Erie Traction Company maintained a slightly curtailed week-day schedule with the exception of providing usual extras for employees of the Lackawanna Steel Company.

New York City

The Interborough Rapid Transit Company on Monday saved about 600 tons of coal by strict application of the order. The Sunday mileage was furnished on Monday, and it was distributed so as to correspond with the expected density of traffic. Taking the elevated, subway and surface lines together, the mileage operated was from 70 to 75 per cent of the usual week-day mileage.

The Third Avenue Railway ran about 80 per cent of normal mileage on Monday, and the fuel saving was proportionate to the reduction in service. The traffic was handled without difficulty, although there was congestion because the demand for service was not reduced appreciably.

The Brooklyn Rapid Transit Company ran about 20 per cent less than regular week-day service on Monday, spacing the cars with special reference to the theater crowds. Everything went smoothly with the exception of the crowding of a few cars in the evening rush. The traffic was somewhat heavier than on an ordinary Sunday.

Furnace Savings at Portland

THE Cumberland County Power & Light Company, Portland, Me., has posted the following notice in the boiler rooms of its power stations:

SAVE COAL

Why

The President requests it.

Saving is both necessary and fashionable.

Economy means efficiency, which spells victory.

Every shovel of coal (20 lb.) is worth 10 cents, the war price of a loaf of bread.

How

Heat only the space actually used, but do not sacrifice ventilation.

Accustom yourself to a room temperature below 70 deg. Use a thermometer.

Start with a clean heater free from air cracks, a whole grate that shakes well and a well-insulated heater and pipes.

Keep a deep fire; shake down the ashes only as the draft makes it necessary. Use chimney cold air inlet and smoke pipe damper to reduce draft. Opening the fire door chills the fire and the heater.

Gas from freshly fired coal should be burned by leaving a small portion of fire exposed.

Clean all heating surfaces thoroughly every week and keep the ash pit empty.

Issued to all our employees to aid them in supporting the work of our fuel administrator.

CUMBERLAND COUNTY POWER AND LIGHT COMPANY.

Hang Up by the Furnace

Six-Cent Fare Granted to Portland Line

Oregon Commission Meets Imperative Need of Company Due to Increased Costs—Refuses Petition of City to Suspend Increase Pending Litigation, but Authorizes Excess Fare Receipts with Tickets

FINDING that the present revenues of the Portland Railway, Light & Power Company are inadequate and that the practices and economies begun under a recent order are not productive of a sufficient return to protect the integrity of the company, the Oregon Public Service Commission has authorized a 6-cent fare for the company, effective Jan. 15. This method of fare increase for Portland the commission prefers to a zone system or a transfer charge.

The company applied for a 6-cent fare on Sept. 6, 1917, and on Oct. 5, 1917, received partial relief. The commission, as described in the *ELECTRIC RAILWAY JOURNAL* of Oct. 27, authorized an increase in rates for unlimited tickets and limited school-children's tickets, and it gave moral support to the ideas of relief from taxation, commission recognition of wage demands, public co-operation in spreading rush-hour traffic, and one-man car operation.

The commission announced that it would keep in touch with the company's operations and take any further action deemed necessary. The report of the company for the period from Oct. 15 to Nov. 30 having been filed, supplemental hearings were held, at which it was shown that the remedies proposed by the commission had resulted in an increase of net revenue of \$20,000 per month. The extent to which the utility had been able to comply with the order and suggestions of the commission were discussed separately. The results, as stated by the commission, are shown in the following paragraphs.

COMPLIANCE WITH PREVIOUS ORDER

Following the issuance of the commission's order, the company resumed wage negotiations with its employees, the parties meeting in a commendable spirit of fairness and moderation and finally entering into an agreement for arbitration. The result was the granting of the demands of the men in full, but with the right reserved to the company to set aside the award, if the commission should not, by Jan. 1, 1918, grant sufficient increase of rates to enable it to pay the new scale of wages. The men now, the commission says, express entire satisfaction with both hours and pay.

The company requested from the Council an explanation as to its power and inclination to remove the unjust public burdens. In reply there was presented to the commission a copy of an opinion of the city attorney directed to the Council and dated Oct. 29, 1917, in which the city attorney held that relief from the burdens of hard surface paving and maintenance thereof and also from bridge tolls can only be granted by an amendment to the charter.

Considerable progress, the commission notes, was made in the spreading of peak loads by changes in the hours of beginning and quitting work in large industrial establishments, but much remains to be done. Office employees and professional men may also vary

their hours in some degree so as to avoid traveling at times when the cars are crowded with those in other occupations.

In the matter of operating one-man cars, it is said, the company feels that under the conditions prevailing in Portland considerations of safety prevent this idea being put into effect, except to a very limited extent.

The first months of the fiscal year have shown a large increase in traffic over the previous year, but the rate of increase is falling off each month. Now at the end of the first half of the year it is evident that the actual increase will be very close to the estimated amount of 15 per cent over 1916-1917.

By a reduction of the number of cars on many lines, the average service in proportion to traffic being now somewhat less than in 1916-1917, a material saving in operating expenses has been effected.

The company's report for November covers the period when the curtailment of service recommended by the commission and the new wage scale of all employees were in effect. For five years the gross revenues for November have averaged 8.33 per cent of the total for the year. Assuming the same ratio for this year, the commission calculates a rate of return of $1\frac{1}{4}$ per cent on the value of the railway property. This return represents the total amount available for both interest and dividends.

In order to bring clearly before the public the relation of the commission to the situation still remaining, the commission describes its three functions as follows:

1. *Administrative*.—"The commission must see that the public gets what it pays for and no less. It must determine both the quality and the extent of the service to be rendered by the utility. Just rates cannot be established except with reference to definite standards of frequency and adequacy of service. In fixing these, the right medium must be found between service which is good, but more costly than the car rider can afford, and that which is cheap, but insufficient to meet his needs. The service must fit both the convenience and the pocketbook of the patron."

2. *Judicial*.—"The commission must see that the public pays for what it gets and no more. The rates charged must be reasonable to the consumer, and so far as this limitation will permit, the rate of return on investment must be fair to the utility. A rate of return which is fair and just for times of industrial stagnation may be entirely inadequate for periods of expansion. Even under fixed conditions these terms are indefinite; there are in every case both upper and lower limits within which any rate of charge or return is fair and reasonable. Within these limits the determination of rates cannot be based on considerations of justice alone."

3. *Financial*.—"If the rates fixed by the commission, while sufficiently high to escape condemnation by the

courts as confiscatory, yield only a return insufficient to attract capital into needed public service, it is the public and not the investor who will suffer. The commission cannot perform this function directly. If any commission should make a practise of enforcing rates which would not attract free capital, it is certain that the community would eventually lose more than it would gain."

Summing up, the commission says that in the consideration of any case justice, of course, takes precedence over profit, but within the limits of reasonableness the commission will be governed by considerations of public policy, bearing in mind the constant need for the investment of new capital in order that the public may be properly served.

Turning then to the case in hand, the commission states that if the Portland company is denied relief, it must inevitably go into the hands of a receiver, for on its interurban lines operating expenses equal receipts, and the earnings of the light and power department are insufficient to meet the bonded interest of the whole system or even to make a fair return upon the investment in that branch of the utility. The primary duty of the receiver would be to conserve the property, and the public would receive service only so far as the interests of the property would permit. Having no means at his command other than the revenue from operations, and no power to increase the fares without the consent of the commission, he would be compelled to cut the service to the point where receipts would equal expenses. Such a reduction of service, the commission asserts, would be intolerable. The commission believes that it would be derelict in its duty if it should refuse the proper amount of relief.

REDUCTION OF SERVICE CANNOT SOLVE PROBLEM

In discussing various methods of relief, the commission says that further curtailment of service has been suggested. At first thought this seems feasible. Operating expenses and bonded interest exceed receipts by only about 12 per cent. If this difference could be overcome, interest on the balance of the investment might wait for better times.

The commission calculates that any saving in cost of transportation must be made out of 81 per cent of the operating expenses. These are estimated at \$2,349,700, excluding deferred maintenance, taxes and depreciation. Of this 81 per cent, or \$1,903,300, will vary with the amount of service.

An increase in net revenue of \$412,000 has been shown to be necessary to cover bonded interest alone. If this is all to be gained by reducing service, a reduction of 22 per cent would be needed. To cover 6 per cent interest on the entire investment of \$18,233,371, as determined by the commission, would require \$789,000 more net revenue, to gain which service must be

cut 41 per cent below the present standard. Such a reduction is said to be utterly impracticable.

Nor would the cost of service be less if the city should take over the system and operate it. With the present service and equal efficiency of management, the operating expenses would be the same as at present, while power instead of being furnished as now at cost would have to be paid for at commercial rates.

Under condemnation, it is not likely that the property could be bought for any less than the commission's valuation, and if the courts took account of the present scale of prices, of materials and labor, the cost would be increased at least 25 per cent.

Money for such purpose could not be obtained for less than 6 per cent, so that the interest charge would be at least as large as now.

Under city management service could be maintained only by a resort to one or more of the following expedients: Reducing service, cutting wages, raising fares or making up the deficit by taxation.

If the zone system were adopted in Portland, it would permit low rates to be maintained in a great part of the city and would compel the long and now unprofitable lines to pay at least the cost of operation. It would also enable the company to meet jitney competition by making low but still profitable rates on the lines of heavy traffic, where alone the jitneys operate.

The commission believes, however, that the adoption of the zone system is inexpedient at this time.

It is estimated, from a study of traffic records for November, 1917, that one-fourth of the travel originates more than 3½ miles from the center of the city. If this distance be adopted as the zone boundary, and a transfer charge added, the additional rate for each zone necessary to make up the deficiency in revenue will be 2 cents. Many riders would thus be compelled to pay 9 cents and some 11 in place of the present single fare. The resulting disturbance in property and rental values would be very great. Many working people would find it necessary to give up their homes in distant suburbs and live nearer their work.

The commission alleges that the satisfactory results of the zone system in European cities are largely due to the fact that there the rich live at a distance and the poor in tenement districts at the heart of the city. In Portland the working classes live at the greatest distances and the extra charges of the zone system would fall almost entirely on them. While the effects of the additional cost of transportation would not alone be sufficient to bring about the formation of a slum district, it would, joined with other causes, tend to do so, and the resultant injury to comfort, health and safety would more than offset the advantages of an ideal system of imposing charges.

Closely connected with the zone system, the commission observes, is the idea of a charge for transfers. There are now about 22,000,000 transfers used per

A Few Pointed Remarks

IT is time for the public to realize that the powers conferred upon public service commissions, thoroughly tested and upheld by the courts, are ample for the protection of the public against all the evils from which they have suffered in the past.

It is time, also, to realize that good service can be obtained only by just and equitable treatment. No starved horse ever pulled a heavy load.

The utilities have been deprived of the power to make unjust profits. They must also be protected against unjust losses.

If a utility is driven into a position where its credit is impaired and it can obtain money for operations and extensions only at unreasonable cost, the public must share the loss.—OREGON PUBLIC SERVICE COMMISSION.

year in Portland. It would require a 4-cent charge on this number to produce the revenue now needed, in addition to the 5-cent fare, but such charge would result in a very great reduction in the use of transfers, making it necessary to raise the price to at least 5 cents, which would be equivalent to abolishing transfers entirely.

The commission states that it hopes to bring about a state of affairs wherein the interests of all shall be properly guarded. The employees are now well cared for. Whenever the revenues reach an amount sufficient to give the owners the minimum fair return on their investment, it will be the policy of this commission so to regulate rates that, with the co-operation of the company, any further profits may be equally divided between the three parties, the employees receiving more wages, the company more revenue and the public better or cheaper service. Efficient management will then be rewarded by increased dividends, and faithful service by higher wages, while the public will profit from both by reduced fares.

SIX-CENT FARE AUTHORIZED

The commission concludes as follows:

1. The practices and economies inaugurated by the utility, pursuant to the former order of the commission, are not productive of an adequate return to protect the integrity of the company.
2. The present revenues derived by the utility from the operation of its railway system are inadequate.
3. The service now afforded is not in excess of the reasonable requirements of the traffic handled.
4. The rates charged and collected as cash fares and for unlimited ticket books are unjust, unreasonable and inadequate.
5. Just, reasonable and adequate rates, effective Jan. 15, are:

Cash fares, 6 cents each.

Unlimited tickets, five tickets for 30 cents, tickets to be on sale by all conductors.

Unlimited tickets in books, fifty tickets for \$2.75.

Limited school children's tickets, 4 cents each.

All tickets and cash fares shall include transfer privileges.

COMMISSION DENIES SUSPENSION OF ITS ORDER

The commission on Jan. 14 denied the petition of the city of Portland asking that the 6-cent fare order be suspended, or its operation postponed pending litigation in the courts. The commission, however, carried out the suggestion of Commissioner Corey that receipt slips be attached to tickets sold by the company, these receipts to be redeemed for the amount of the excess fare charged, in event the courts declare the order invalid.

The order says in part:

"Our investigation discloses that the need for additional revenue is imperative and cannot be delayed without serious consequences.

"If the effective date of our order be postponed until the matter is finally determined by the courts, the incentive for speedy action will be removed and the case might be allowed to drag along indefinitely, depriving the company of much needed revenue.

Pointed Hints—and Useful Data

THE Beaver Valley Traction Company, New Brighton, Pa., has just issued to its patrons some cleverly devised celluloid cards, 2 $\frac{3}{8}$ in. x 4 $\frac{1}{8}$ in. One of the cards is reproduced herewith.

The front of the card reminds patrons that although they may not have a chance to win their stripes in the service, there are chances for them to do their share at home. Then follow these pointed suggestions: "Purchase Liberty bonds. Send reading matter and smokes to the boys. Observe suggestions of the food dictator. Prevent loss and waste through accidents."

You may not have a chance to win your stripes
in the service
But chances to do your bit are presented daily
at home

PURCHASE LIBERTY BONDS

Send reading matter and smokes to the boys
Observe suggestions of the Food Dictator
Prevent loss and waste through accidents

THE BEAVER VALLEY TRACTION COMPANY



FRONT AND BACK VIEWS OF PATRIOTIC CARDS BEARING TIMELY SUGGESTIONS AND INFORMATION

The reverse side of the card contains the various insignia of the United States Army—information of great interest to those who have friends or relatives in the service and to laymen generally. Small reproductions are made of the shoulder marks for officers, collar devices, the chevrons for non-commissioned officers and the various specialty marks.

Union Scale of Wages and Hours

THE union scales of wages and hours of labor for 101 of the principal trades in forty-eight of the leading cities in the United States prevailing in May, 1916, are published in Bulletin 214, just issued by the bureau of labor statistics of the United States Department of Labor.

Reports of weekly wages were received from ninety-nine trades. In eighty of these the average rate of wages, taken collectively, was higher on May 15, 1916, than on May 1, 1915. In nineteen trades there was no change, and in no trade was the average rate lower. As regards the rates of wages per hour, as distinguished from rates per week, eighty-three trades showed an increase, eighteen showed no change, and for none was the rate lower. Taken collectively, rates per hour in 1916 were 4 per cent higher than in 1915, 5 per cent higher than in 1914, 14 per cent higher than in 1910, and 19 per cent higher than in 1907.

American Association News

War Board Work Summarized in Pamphlet Form.

Dr. Conway Presents Data Showing How Electric Railway Profits Have Decreased in Recent Years.

Work of War Board Reviewed

THE New York Electric Railway Association has reprinted in pamphlet form the address which Director Allen gave at a meeting of executives of the association on Dec. 13 on the work of the War Board. It outlines, among other things, the program for fuel saving on the Washington (D. C.) lines recommended by the fuel conservation committee of the Electric Railway War Board. This includes staggered hours of opening and closing some of the departments, skip stops, reduction of heating in rush hours, co-operation by the platform men, etc. This report was to be reviewed by the engineering committee of the National Research

Council, of which Dr. Durand, Gano Dunn and L. B. Stillwell are members, and then submitted to Dr. Garfield. It also says that similar studies were to be made in Baltimore and Cleveland.

Some Diagrams Showing the Need for Higher Fares

BEFORE the Connecticut Company section on Jan. 15 Dr. Thomas Conway, Jr., summarized the present economic status of the electric railway industry. This was done for the purpose of furnishing ammunition to the employees for use in discussing with the public the need of the company for higher fares. A brief report of the meeting was printed in last week's issue of this paper. This week a number of diagrams selected from those shown on the screen by the speaker are reproduced. These diagrams make graphic a situation already quite familiar, which has been covered from all angles in many articles in the JOURNAL. It is convenient, however, to have them in form for easy reference, and their publication is timely, as they were prepared for use in the higher fare case pending at Hartford, Conn. The diagrams tell their own story.

In introducing the diagrams Dr. Conway reminded his hearers that in appealing for protection of electric railway interests it is not only the investment for

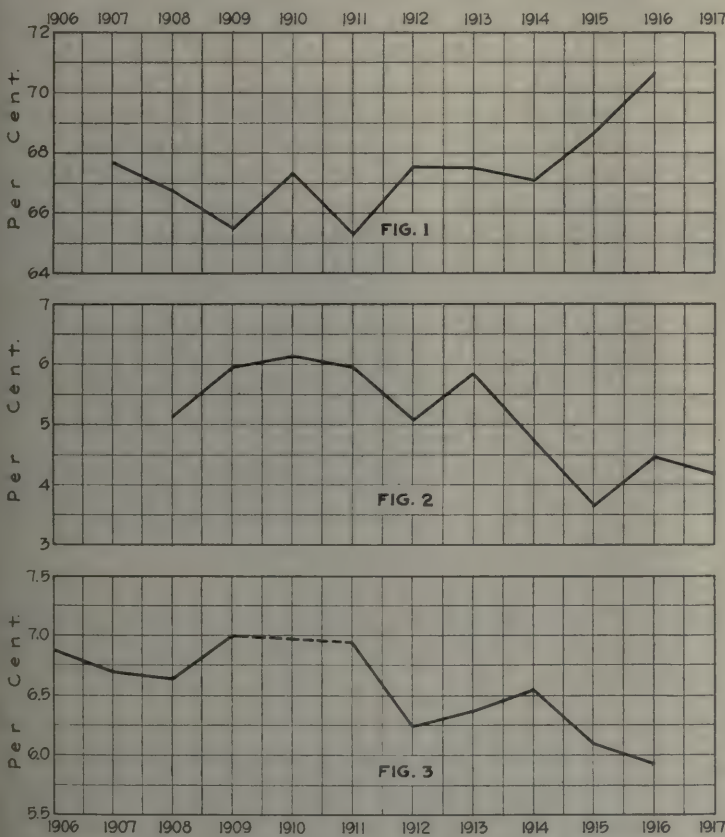


Fig. 1—Ratio of Operating Expenses to Gross Earnings of Massachusetts Electric Railways from 1907 to 1916
Fig. 2—Net Earnings of the Rhode Island Company from 1908 to 1917 in Percentage of Reproduction Value
Fig. 3—Net Earnings Per Mile of Track from 1906 to 1916 in Percentage of Cost of Main Track of Massachusetts Railways
Fig. 4—Margin of Safety of Bonds of Twenty-seven Companies in New York State Petitioning for Higher Fares and for All Electric Railways in the Second Public Service District. Roads Included in Both Cases Are Those Having Bonds Outstanding

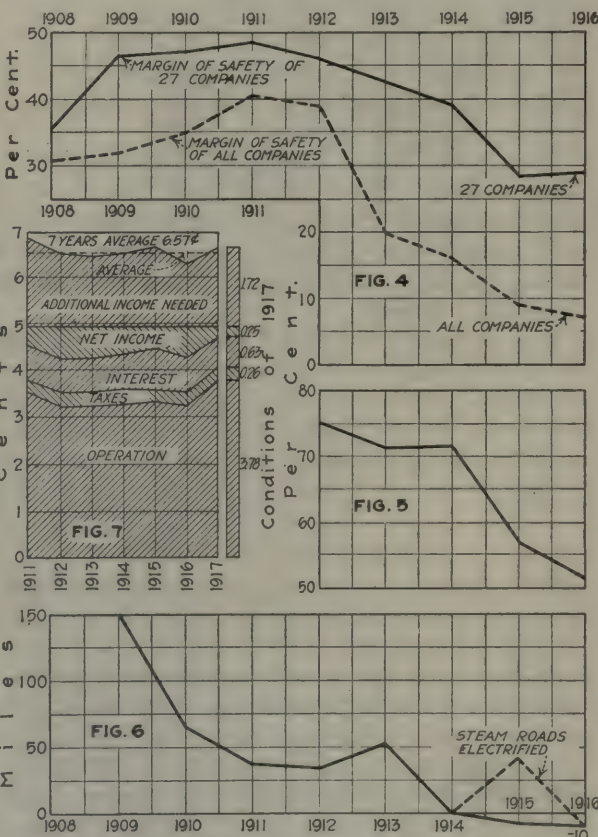


Fig. 5—Comparison of Margin of Safety for Funded Debt of Massachusetts Electric Railways from 1912 to 1916
Fig. 6—New Electric Railway Mileage Put Into Operation in Each Year from 1909 to 1916 in the Second Public Service District of New York
Fig. 7—Chart Showing Average Rate of Fare Per Passenger Which Would Have Been Necessary to Cover Operating Expenses, Taxes and 8 Per Cent Upon the Book Value of the Property Used and Useful in Railway Service, Connecticut Company, 1911 to 1917

Publicity Fermenting in the Electric Railway Situation

Recent Instances Are Quoted to Prove This Statement
—Commissions and Newspapers Are Beginning to
Recognize Serious Condition of Railways

BY IVY LEE

THE policy of full publicity for things relating to the electric railways is proving itself. It is having a most noteworthy effect in expressions of fair-mindedness toward the companies that not so many months ago were almost uniformly expressions of intolerance.

Public service commissions are becoming more and more appreciative of the real relationship of the public to public services. Recent evidences on this point are numerous. The latest manifestation is to be found in the opinion just rendered by Commissioner Travis H. Whitney of the First District of New York. While the important point in this opinion is its conclusion (as fully told in the columns of the JOURNAL last week) that the commission is without power to grant the petition of the New York & North Shore Traction Company for an increase of fare from 5 to 7 cents, it is of great interest to note that the commissioner does not stop there. Having stated, as one of the logical steps in the development of his opinion, that the company has fully established the necessity of a greater income and that the public service is threatened by a state of facts that condemns the company "to a slow but ignominious extinction," he then goes into a field he is not called upon, for the purpose of the decision, to explore. He discusses other ways of meeting the company's problem, moralizing in detail and at length on the responsibilities of the public.

Taking the North Shore case as typical, he boldly places a share of the responsibility for such instances on the shoulders of city and State authorities in having encompassed the railways with onerous restrictions certain, in time, to put the company and the public's service in jeopardy.

The up-State commission has been just as frank in its acknowledgment of the true bearings of similar problems. Chairman Van Santvoord was, at first, frankly in line with the view that the commission had no power to raise street car fares above the maximum stipulated in its franchise, but just as frankly an-

(Concluded from page 187)

which protection is sought, but also the welfare of an enormous group of employees. This is a point which is often overlooked.

The public prejudice which employees are called upon to dispel is caused by conditions which have no bearing on the present situation. It is true that in the early days, under the inspiration of over-enthusiasm, roads were built which could never be profitable. Some were also built to sell. Due partly to the propaganda of muckraking magazines, an exaggerated idea of the profits of electric railways has become prevalent. There is a notion abroad also that the roads are greatly over-capitalized. Since 1907 public service commissions have been organized in forty-seven states. These will see that the capitalization of the railways is proper. The charts show the present situation with reference to income and actual costs.

nounced, in view of the public need, his change of viewpoint.

Commissioner Emmet took, as the foundation stone of his concurring opinion, the view that the public service is the paramount consideration.

The public press, too, shows a similar spirit. At first the up-State papers viewed coldly—to say the very least—the proposition of increasing fares. But when the companies had exhibited their figures, such journals as the *Syracuse Post-Standard* and *Utica Observer* led many others in agreeing that the companies—to preserve service, and that was the ruling consideration—must be relieved, if not by higher fares, then by charges for transfers or remission of franchise taxes, paving taxes, etc.

OTHER INSTANCES FROM NEIGHBORING STATES

In Massachusetts the commission at first increased many fares, and later, on finding even the increase granted insufficient to meet the rising costs of operation, permitted the installation of zone systems. The action in Holyoke, Mass., is the latest in that respect. And the whole situation was intelligently reviewed and accepted by powerful Massachusetts papers.

In Trenton, N. J., Peter Witt, formerly street car commissioner of the city of Cleveland, when called in to report on the local traction situation, was expected, apparently, to put all the blame on the electric railway company. But, while making many suggestions for improvement of the company's service, he just as frankly reported to the City Commission that the responsibility of the city and the citizens of Trenton must be frankly recognized.

Peter Witt's blunt recognition of responsibility of the city's and citizen's interest in the welfare of the public's service cannot but have its effect far beyond Trenton's limits.

H. B. Weatherwax, vice-president of the United Traction Company of Albany, in an article recently printed in *The Commercial and Financial Chronicle*, says, in his review of public opinion as a result of a year's policy of publicity on the affairs of New York companies:

"The first idea was one of antagonism. The present idea is one of co-operation. . . . There is an enormously better appreciation of the facts bearing on the industry, both on the part of the public and on the part of public service commissions, not only in this State but throughout the country. . . . The present situation looks distinctly forward, not backward. A year ago this could not have been said."

Plainly, the policy of publicity is educating the public that its interests and the public's are one. The policy is proving itself.

Electrification of Swiss Railways

The Administrative Council of the Swiss Federal Railways has decided to install electric traction in the near future upon the branch railway lines between Scherzlingen and Berne, and between Brigue and Sion; and for this purpose a credit of 9,700,000 francs has been voted.

The main reason given for the above step is the increasing scarcity of coal, which, according to a report of the railway directorates, threatens to become a real calamity for Switzerland.

CONSTRUCTION, MAINTENANCE AND EQUIPMENT

ENGINEERS, MASTER MECHANICS AND OTHERS WHO HAVE DEVELOPED ECONOMICAL PRACTICES, OR WHO HAVE WORTH-WHILE IDEAS ARE INVITED TO TELL READERS OF THE JOURNAL ABOUT THEM IN THIS DEPARTMENT

New 20-Ton Sand Car Built in Railway Shops

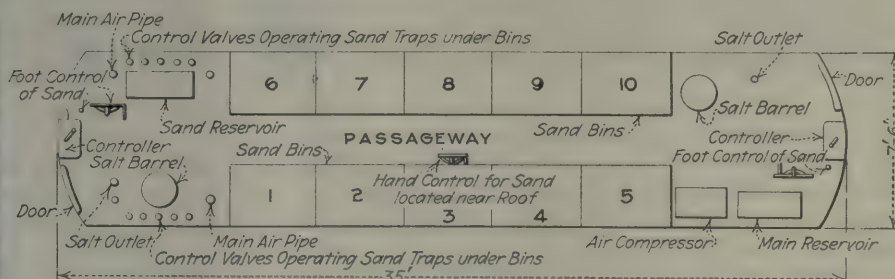
BY GEORGE C. TABER

Mechanical Engineer Union Street Railway, New Bedford, Mass.

THE Union Street Railway of New Bedford, Mass., has recently built in its own shops for local service a sand car of improved design, which is operated in connection with a 100-ton drying plant located at the Weld Street carhouse. The company owns sand banks 7 miles distant, and at present is hauling sand from this site in a 3-ton gasoline truck for storage and subsequent general use on the system. In the near future a steel flat car will be substituted in this service.

Upon being received at Weld Street the sand is elevated by Link Belt conveying equipment to bins on the second floor of the carhouse. From there it falls into the drier and thence to a receiving pit in the floor,

from which the dry sand is elevated by conveyor buckets to storage bins on the second floor level. Two spouts serve passenger cars



END VIEW OF HOME-MADE SAND CAR AND SKETCH OF INTERIOR ARRANGEMENT

and the sand car from these bins as required. The drier is heated by steam coils connected with the carhouse boiler plant.

The new sand car is 35 ft. long over all and 7½ ft. wide and is 12½ ft. high from rail to trolley base. It has a semi-steel underframe and weighs about 20 tons light, with capacity for 10 tons additional. It is equipped with four Westinghouse 101-B motors and two standard 0-50 trucks with 33-in. wheels, truck centers 17 ft. and 4 ft. 6-in. wheelbase. End doors are provided for the crew, and on each side are three hinged doors, each 6 ft. long and 2 ft. wide, which can be fastened open when loading the car at the carhouse. A Mosher arc headlight, Westinghouse straight air brakes and Jones hand brakes and a Westinghouse A-5 air compressor are used. The car carries a 3-in. manilla

cable and a 4-in. x 6-in. x 8 ft. timber for use in emergencies, besides a number of small tools. The sand capacity of the car enables it to cover from 10 to 15 miles of track. For use at switches, frogs, etc., the car carries ½ ton of salt, which is scooped out of a storage barrel and discharged through a funnel upon the track as required.

The sand is stored within the car body in ten bins of 1-ton capacity each, the discharge being controlled by an air-operated valve, which facilitates sanding either track at the convenience of the operator. An automatic valve provides that the air pressure must rise to 50 lb. in the brake reservoir before any compressed air can be delivered into the air piping connected with the sand discharge valves. An air reservoir for sand valve operation is mounted beneath the roof of the car.

Efficient Boilers from Scrap Pile

ON account of the rapidly increasing growth of business of the Little Rock Railway & Electric Company, it recently became necessary to enlarge the boiler capacity. Because of high material costs, it was decided to utilize some of the equipment in the plant of the Merchants Lighting Company, taken over in 1915. Among this equipment there were four 600 hp. Babcock & Wilcox boilers built for 200-lb. operating pressure

and two of these were moved to the plant of the Little Rock Company.

The installation was made with the boilers set at a sufficient height to provide a basement for handling the coal and in this basement was located three Buffalo Forge blowers direct connected to a Terry turbine. All the supports for these boilers were structural steel, each boiler being equipped with an individual stack 8 ft. in diameter by 150 ft. high with an individual hopper of 2-ton capacity. Coal is supplied and ashes are disposed of by means of carts and elevator.

The new equipment has proved exceedingly satisfactory, the boilers having been operated as high as 350 per cent rating. The use of blowers for these boilers, driven by Terry steam turbines, has also increased the temperature of the boiler feed water very materially.

Welded Rail Joints

Reasons for the Increasing Popularity of Arc Welding for This Purpose—Details Regarding Recently Introduced Method Are Given

BY MARTIN SCHREIBER

Chief Engineer Public Service Railway, Newark, N. J.

IT IS fairly well understood that joints, directly or indirectly, constitute the most important single item of construction and maintenance of electric railway track. Theoretically a properly welded joint has a decided advantage over a mechanical one, not only for giving a continuous rail for the operation of cars and a life presumably equal to the rail itself, but also an excellent return circuit for the electric current. These cardinal principles were recognized by track engineers over two decades ago. Then there was a general wave of interest in welded joints over the electric railway field, and many thousands of electric and cast welded joints were installed at that time. As with most new ideas, the first application of welded joints was doomed to failure. Any number of these welds broke soon after installation, or the rail ends cupped

welded joints was due to a variety of causes. The important ones were overheating and damaging of the metal in the rail ends, and failure to grind down the joint to a smooth surface after welding. Once the old troubles with the welding were thoroughly understood the faults were in a large way eradicated. The result was that the welded joints became popular.

Since 1908 the Public Service Railway alone has installed approximately 100,000 Lorain electrically welded joints, or joints for, say, 450 miles of single track. On the whole these joints have been satisfactory. Likewise a great many cast and thermit welds have been installed throughout the country with equal success.

In spite of the good results secured with the established methods of joint welding, the stress of these times in which greater efficiency and economy are demanded has caused many to give a great deal of thought to simplifying the present welding process. The object has been to find a method that will at least be as cheap and that can be applied under traffic. Back in 1909, with this thought uppermost in mind the writer caused certain experiments to be performed with the oxy-acetylene flame. Fig. 3 shows a piece of special



FIGS. 1 AND 2—ELECTRIC ARC WELDING OF TRACK JOINTS ON PUBLIC SERVICE RAILWAY

out so badly that it was necessary to cut out the joints and install short sections of rail, requiring two mechanical joints for each fracture. Otherwise the track had to be rebuilt and economical operation suspended.

So almost everyone who had anything to do with the installation of these joints was glad to be let alone long enough to get back to his "first love," the mechanical joint. There was then a vigorous revival of the mechanical joint. This, however, in spite of improvements and special designs that were introduced, was not perfected to a satisfactory degree. Even the joints with drilled holes and fitted bolts or rivets failed after a few years. And once a joint started to loosen and the rail ends moved, the deterioration of the rail ends was very rapid.

Long life of the joint is of the utmost importance. Joint repairs generally in these days involve expensive paving repairs, proper consideration of return circuit, and, incidentally, electrolysis cannot be overlooked. Electric railway engineers naturally turned again to the welded joint, appreciating that theoretically it is ideal, and that its failure in the past had been due to improper practical application. The failure of the

work that was broken, and how it was repaired and joined up with the existing track in Montgomery Street, Jersey City, by this method.

Since 1912 considerable progress has been made with electric arc welding of joints, and it is the purpose of this article to call attention to some actual work performed along this line in connection with track work of the Public Service Railway. The *ELECTRIC RAILWAY JOURNAL*, in the Sept. 1, 1917, issue, page 362, gave a description of some experimental combination electric arc welded and continuous joints installed in Newark, N. J. The performance of these joints is still under observation.

We have just completed the reconstruction of some 3000 ft. of track on Washington Avenue, Newark, where the new methods of the Atlantic Welding Company were adopted. The track was laid with new grooved girder section, Lorain No. 116-434 rail. The plates used were old channel bars, planed at top and bottom to facilitate welding, as shown in Fig. 4. The apparatus used at the joint is seen in Fig. 7. It includes a special composition bar clamped along the full length of the plate. This bar has a powerful controlling

effect on the arc and at the same time holds the welding metal in place, even when the actual weld occurs on a nearly vertical surface. The welding company claims basic patents on this feature. Suitable guide rods are attached to the joint apparatus, greatly facilitating the making of the weld, and the welder is able to secure fairly uniform results. The whole joint device is

head and base of the rail for the length of the joint. The necessary additional welding material is supplied in advance by laying a soft steel rod in the groove way provided in the joint plate, as is clearly shown in Fig. 7. The amount of metal planed off the plate allows for the thorough and rapid fusing of the surfaces at that point, so the rod when welded in place fills the triangular

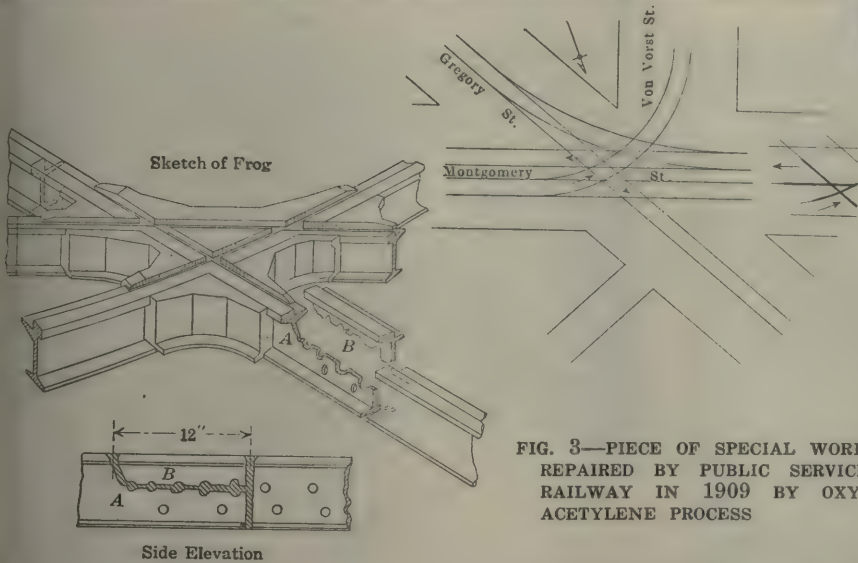


FIG. 3—PIECE OF SPECIAL WORK REPAIRED BY PUBLIC SERVICE RAILWAY IN 1909 BY OXY-ACETYLENE PROCESS

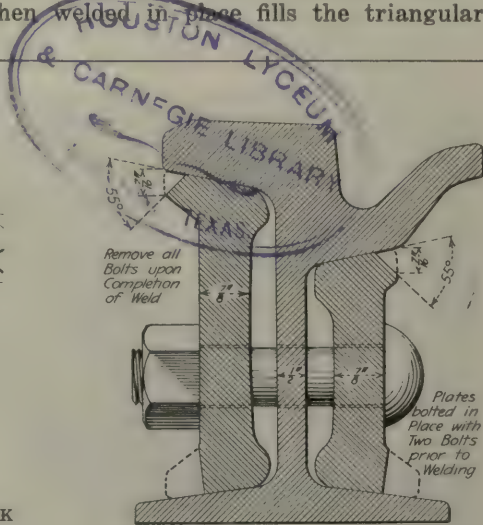


FIG. 4—CROSS-SECTION JOINT READY FOR ARC WELDING

clamped to the rail in place, and does not interfere with the operation of cars in any way.

A view of the welding generator is shown in Fig. 5. The machine is really a direct-current dynamotor that supplies a suitable welding current of about 350 amp. at 60 volts. The current taken from the trolley wire is approximately 38 amp. The outfit weighs only 1100 lb. and can be moved about conveniently by the two operators. It is supplied with a weatherproof case that can be seen in Fig. 6. The whole arrangement is simple and substantial. It is the intention later to mount one of these generators on a Ford chassis, as the construction of the machine readily adjusts itself to this arrangement.

The fundamental principle of welding the plates to the rail applied with this equipment is not new. The method consists of drawing a carbon arc along the upper and lower edges of the plates, welding them to the

groove, leaving a tough close-grained weld of good quality about 1/2 in. deep. The joint when complete thus forms a box girder and the plates when so attached support the rail where the strength is most needed. The joint is independent of the web, which after all is the weakest part. The web, of course, is not affected by heating or in any other way.

The actual time consumed in making the weld is about twenty minutes, so that track can be welded at the rate of two and one-half joints per hour, taking ordinary headway of cars into consideration. In the particular instance of Washington Avenue, Newark, there was a four-minute headway. The energy required per joint, at the rate of a joint in twenty minutes, is about 7 kw.-hr.

The writer was interested to ascertain the effect that the welding had on the original metal of the rail and

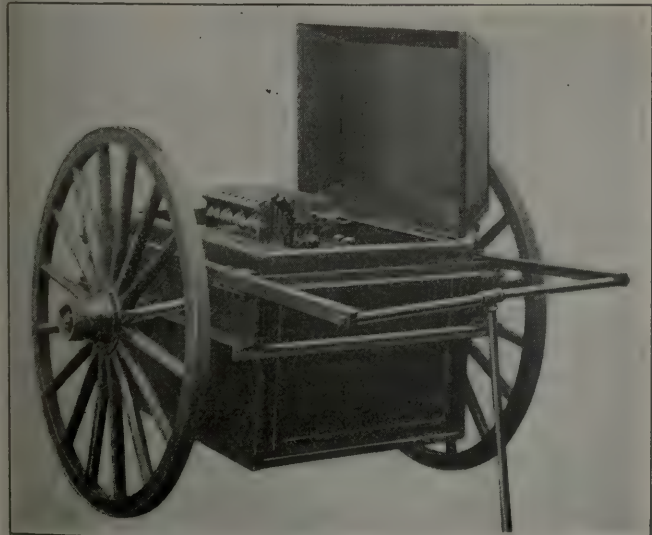


FIG. 5—GENERATOR FOR USE IN MAKING ELECTRIC ARC WELDS



FIG. 6—WELDING RAIL JOINTS WITH THE ELECTRIC ARC

plates. It was found that the Brinell hardness test and the scleroscope test showed no material change. This is a matter of the utmost importance in obtaining a substantial joint.

In Fig. 8 are shown the results of the scleroscope test on one of these arc-welded joints. The result of a test made at the Watertown Arsenal was also examined, and it was found that the tensile strength

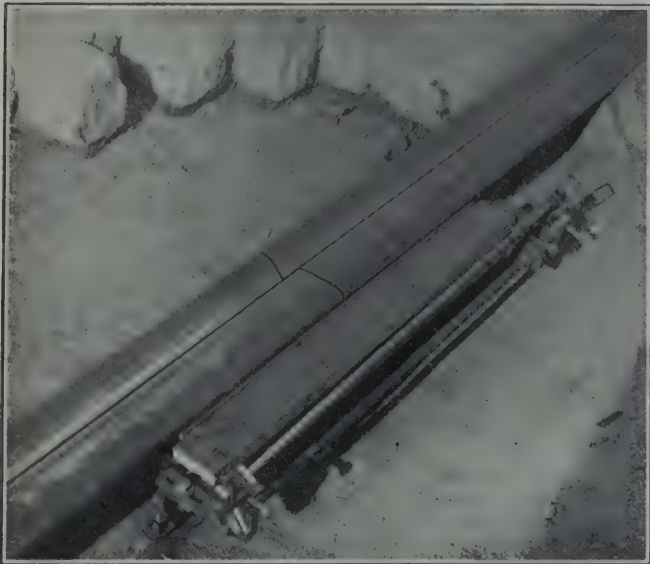


FIG. 7—APPARATUS FOR ARC WELDING OF JOINTS

of the joint was greater than the plates themselves. A transverse test made on a 4-ft. span and with a concentrated load of 50 tons at the center showed less than 1/4 in. set.

The electrical conductance of these joints compares favorably with that of the solid rail. Up to date the Public Service Railway has installed about 1000 of the electric arc-weld joints of various kinds and considering the newness of the method the joints seem to be satisfactory. It is our

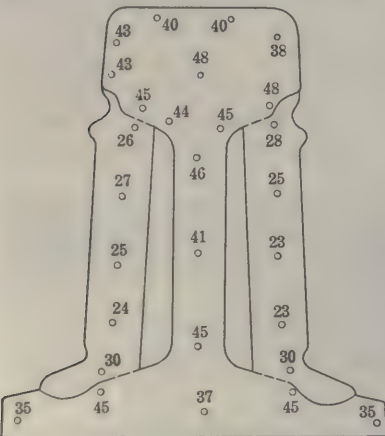


FIG. 8—DIAGRAM SHOWING THE RESULTS OF A HARDNESS TEST ON ELECTRIC ARC-WELDED JOINT

intention to continue the installation of these joints, particularly when traffic cannot be held up.

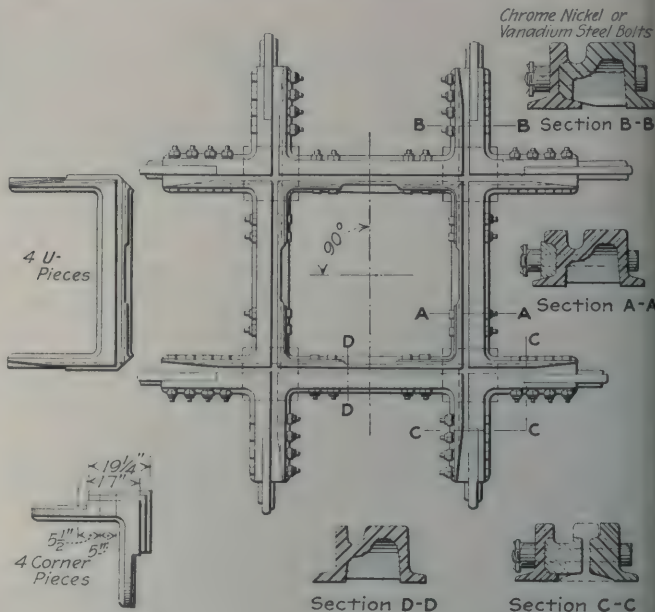
It is the writer's opinion that these welds are not only apparently satisfactory but have two strong features in their favor; first, low cost; and, second, convenience of installation. Moreover, a minimum amount of pavement need be disturbed in order to install a joint. Then again, it is convenient to install joints as the rail is being laid so that the track work can be completed one small piece at a time, instead of paving the joints temporarily or leaving them open to be welded at some future date. Also when it is necessary to disturb the pavement a very small amount of paving material is required to be removed and replaced.

Articulating Manganese Crossings for Longer Life

How the Articulated Crossing Avoids the Objection to a Solidly Cast Intersection and Retains the Qualities of Cast Manganese Steel

THE history of the design of rail crossings for heavy service is one of constant effort to overcome the effect of heavy wear and shock with improved methods of construction.

In the days of rail crossings made successively of Bessemer, open-hearth and rolled manganese steel the great difficulty in maintenance was due to loosening and breakage of the main filling or backbone of the crossings under the increasingly heavier loads and higher speeds. The next step was the introduction of a manganese insert in these crossings, but this too failed in time because the bolts could not hold the structure together, as there were too many small parts wearing one against the other. The next step was the use of cast manganese crossings having the intersections or corners cast solid, and made in one, two or four



DETAILS OF ARTICULATED RIGHT-ANGLE CROSSING

pieces, spliced together with fishplates and joints inside the gage lines of the track. This was expected to overcome the objections raised by the use of bolts in the crossings, as bolts were almost entirely eliminated.

However, an entirely unforeseen difficulty developed, namely, the occurrence of segregation and infinitesimally small hair cracks in the bottom of the grooves at flangeway intersections. These led rapidly to a separation of the corners from the rest of the casting, due to the weaving action when trains passed over, whereby the thin, already-weakened metal in the bottom of the flangeways was rapidly fatigued and ruptured. The development of the lines of rupture along the bottom of the flangeways would practically break up the casting and make it useless despite the fact that the tread or wearing surface itself might still be in perfect condition.

According to experts, this defect of the solid manganese casting cannot be eradicated. A manganese casting resembles an ingot such as is used in making rolled

rail, in that the larger the piece the larger will be the void or pipe therein. Consequently, no casting having unequal sections is of equal density throughout, the masses around the pipe being much spongier than the thinner sections and in a manganese crossing with the intersections cast solid the greatest amount of spongy metal would be at the points of double wear adjacent to the flangeway intersections. Another cause of failure is that the metal in the bottom of the flangeway at the

pieces and four U-pieces. These eight parts are held in place by high-grade heat-treated steel bolts of the largest diameter practicable and angle bars or knees to connect the U-pieces at the interior corners. The wings are so designed that, together with a filler, they clamp the end of the running rail tightly in position in each of the crossing arms. An easer is also provided at the extremity of each corner piece.

In this form of construction the interior splices or



CLOSE VIEW OF RAIL INTERSECTION IN
ARTICULATED CROSSING



TYPICAL FAILURE IN SOLID CASTING AT RAIL
INTERSECTION IN CROSSING

intersections, which also tends to have a spongy structure, fails to amalgamate properly at the time the molten metal is poured into the mold. This failure to amalgamate is caused by a ridge of sand which forms in the flangeway intersection in the mold, the casting being poured in an inverted position. To overcome this manufacturers have removed the ridge at the intersection so that the casting can be poured as one piece, the idea being to machine out the groove desired. This practice, however, increases the mass of the casting and so tends to aggravate rather than ameliorate the troubles due to sponginess.

Another argument against the use of this form of construction is the liability of the splices or fishplates at the interior joints to breakage.

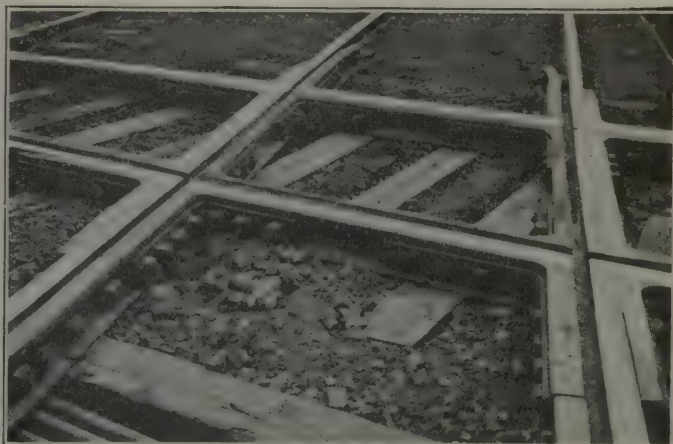
The problem, therefore, resolves itself to this: How can we obtain the wonderful wearing qualities of manganese steel at the points where most needed, inasmuch as crossings made with the intersections cast solid tend to have the poorest metal located at the most critical point?

A solution of this question has been offered by Stephen Balkwill, an experienced maker of special work. Mr. Balkwill applies the principle that the smaller the casting the less it is subject to blemish and imperfection, as strains and stresses set up in large castings are much greater and more liable to breakage due to shrinkage in the cooling than in small castings. Hence he has developed a type built up of sections, known as the Balkwill articulated cast-manganese crossing. In this crossing the joints are mechanically made and placed at the very locations where cracks previously occurred, thus securing absolute control as to where the separation should occur. Consequently it is expected that the crossing will be just flexible enough to yield under loads instead of resisting until the usual cracks develop in the flangeway intersections.

A Balkwill articulated cast-manganese crossing consists of eight castings, comprising four corner

fishplates are entirely eliminated in crossings of 90 deg. to approximately 45 deg.

The first of these crossings was installed in June, 1915, where the service conditions soon proved that it was as correct in practice as in theory. This particular crossing, which is 90 deg., is at an intersection of the New York Central main line and the Baltimore & Ohio's ore and coal carrying line at Painesville, Ohio. The service at this intersection is so severe that crossings of Bessemer or open-hearth rolled rails average only a fraction of the life already obtained with the articulated design, and the latter after two and one-half years of service is only half worn out. After resurfacing, this crossing will be in position to give at



AN ARTICULATED MANGANESE ANGLE CROSSING

least two or more years' service at this location. Since the installation on this pioneer crossing several score have been installed throughout the Central and Western States at points with particularly severe service.

In order to make this type of crossing and other special work inventions immediately accessible to railways throughout the United States and Canada, the Balkwill



TYPE OF ONE-MAN CAR OPERATED IN EDMONTON

One-Man Cars at Edmonton Have Novel Entrance Door

THE accompanying photograph shows the type of one-man car in operation by the Edmonton (Canada) Radial Railway. At the present time, seventeen of these cars are in operation and six more are to be placed in service in the near future.

J. H. Moir, superintendent, reports that the result of one-man operation has been gratifying and satisfactory and that since this operation began on Oct. 17 not a step accident has been experienced. He also states that the same schedule time is being made as with the two-man cars and that the patrons are well satisfied with the one-man operation.

(Concluded from page 193)

Manganese Crossing Company of Cleveland has been formed to license any manufacturer of special work, or any railway which makes its own special work, to apply the features described. A number of prominent manufacturers are licensed to make these crossings and are prepared to furnish them with reasonable promptness. Mr. Balkwill is prepared to help any frog maker who has no foundry of his own to secure the necessary manganese castings which can be done on very short notice.

Fire Test of Building Columns

A SERIES of 100 tests to determine the strength of building columns in case of fire, which are being conducted jointly by the Associated Factory Mutual Fire Insurance Companies, the National Board of Fire Underwriters, and the Federal Bureau of Standards at Underwriters' Laboratories, Chicago, are expected to develop data of great interest to engineers, architects, and others interested in building construction. These are the first tests ever made employing modern forms of columns and methods of protection. They were preceded by several years' work preparing the testing apparatus and test specimens. The work was begun last summer, and a year's time will be required to complete the series.

The tests are made on full-size columns of various steel sections, 12 ft. 8 in. effective length, and protected by concrete, tile and other coverings. One unprotected column of each type is also tested. Pressure is applied by means of a hydraulic ram, while the test pieces are heated in a gas furnace, the temperature of which is increased according to a specified standard temperature curve up to 2300 deg. Fahr. at the end of eight hours. The temperature of the furnace is measured with platinum and base-metal thermo-couples supported in porcelain tubes at two elevations, and that of the columns is measured by means of base-metal thermo-couples attached to the metal of the columns at four elevations. An automatic potentiometer recorder is connected so that graphic records of temperature can be obtained.

The compression and expansion are measured by means of wire attached to the column at each end of a gage length of 37 in. Readings of vertical movements are taken by means of microscopes mounted in micrometer slides. The tests are continued to a breakdown of the sample, and hence no inferences as to the comparative merits of the different column designs shown in the accompanying illustration can be drawn. The time to obtain failure for the columns tested thus far varies from seventeen minutes for the unprotected columns to more than eight hours for those heavily protected. Differences of 100 per cent in effectiveness of fire-resistive materials have already been found between concrete of different aggregates. The figure below shows several columns after failure.



TEST SPECIMENS OF BUILDING COLUMNS BROKEN DOWN IN FIRE TESTS TO DETERMINE EFFECTIVENESS OF COVERINGS

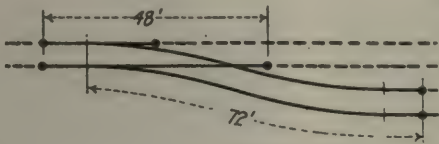
Cost Data on Special Work Construction—II

By M. BERNARD
Assistant Engineer Way & Structures Department,
Brooklyn (N. Y.) Rapid Transit System

This is the second plate of the series of Cost Data on Special Work Construction supplementing the series of plates giving Cost Data on Special Work Renewals. The following four units are of the same types as those covered in the issues of Dec. 8, page 1043, Figs. 28, 29 and 30; Nov. 10, page 871, Fig. 21.

Fig. 5—Side Turnout

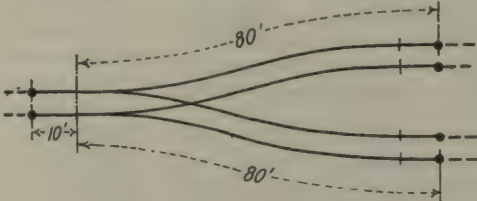
Length—120 ft. single track
New construction—7-in. girder rail*—5-in. granite on concrete
Old construction—street graded, unpaved



	No Traffic
Labor	\$144.00
Handling	66.00
Miscellaneous	16.00
Total (except materials).....	\$226.00
Cost per single track foot.....	1.89

Fig. 6—Equilateral Turnout

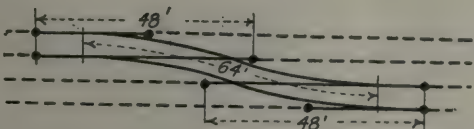
Length—170 ft. single track
New construction—7-in. girder rail*—5-in. granite on concrete
Old construction—street graded, unpaved



	No Traffic
Labor	\$215.00
Handling	95.00
Miscellaneous	25.00
Total (except materials).....	\$335.00
Cost per single track foot.....	1.97

Fig. 7—Right Hand Cross-over

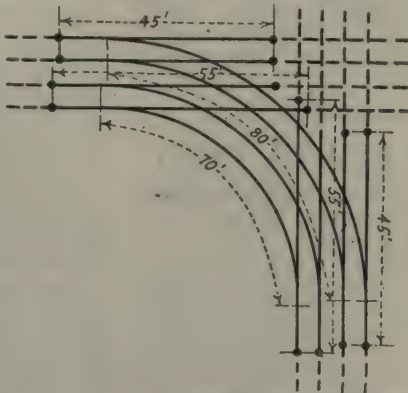
Length—160 ft. single track
New construction—7-in. girder rail*—5-in. granite on concrete
Old construction—street graded, unpaved



	No Traffic
Labor	\$230.00
Handling	60.00
Miscellaneous	30.00
Total (except materials).....	\$320.00
Cost per single track foot.....	2.00

Fig. 8—D.T. Connecting Curve (90 Deg.)

Length—350 ft. single track
Construction removed—9-in. girder rail*—8-in. granite on sand
New construction—9-in. girder rail*—8-in. granite on concrete



	Light Traffic	Average Traffic	Heavy Traffic
Labor	\$570.00	\$640.00	\$710.00
Handling	180.00	190.00	200.00
Miscellaneous	100.00	120.00	140.00
Total (except materials).....	\$850.00	\$950.00	\$1,050.00
Cost per single track foot..	2.43	2.72	3.00

*Hard-center construction. Explanation: By "light traffic" is meant either the divergence of cars during progress of work or a traffic of not more than 150 cars per day of twenty-four hours. "Average traffic" denotes the passage of about 325 cars per day of twenty-four hours, and "heavy traffic" that of 750 or more.
By "labor" is meant the labor cost of tearing out the old paving and special work and installing the new at the location where the work is done. "Handling" signifies the cost of loading the necessary materials at the various storage yards as well as the unloading of same at the place of renewal. It also includes the cost of transportation and the cost of removal of old or left-over material. Since the transportation

is done by a subsidiary company, which adds profit and overhead expense to the net cost, this item may differ considerably from that obtained on other railways. Under "miscellaneous" are included the expense of city inspectors, expense incurred when portable crossovers are used for divergence of cars during renewal, watchmen's wages, and incidental engineering expense. The total of these three items—labor, handling and miscellaneous—therefore includes everything except the cost of materials.
On account of the unsettled labor conditions prevailing since the beginning of the war, the costs given are based on pre-war wages, the average track labor on which these costs are based is 20 cents per hour, including the foreman's wages.

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

Statement by Arbitrators

Majority of Puget Sound Board Urge a Physical Valuation and Relief for the Railway

A supplementary statement with recommendations was issued on Jan. 5 by Dr. Henry Suzzallo and C. J. Franklin, comprising a majority of the arbitration board which recently settled the differences between the Puget Sound Traction, Light & Power Company and the Tacoma Railway & Power Company and their employees. A separate statement with recommendations was also issued by James A. Duncan, the third member of the board, representing the men.

Dr. Suzzallo and Mr. Franklin, besides urging a valuation of the property of the Puget Sound Traction, Light & Power Company by the State Public Service Commission, as has already been done in the case of the Tacoma Railway & Power Company, recommended an increase in the fares, a charge for transfers, relief to the company from certain franchise obligations, such as maintaining crossing police, paving between tracks and the 2 per cent gross income tax.

Mr. Duncan said that it was not fair to deny to the company's employees an eight-hour day and a reasonable wage because of war conditions, and to grant an eight-hour day to other workers at wages that come near meeting increased costs.

Tinkering St. Louis Grant

Disorder Prevents Aldermanic Committee From Completing Its Franchise Program

The public utilities committee of the Board of Aldermen of St. Louis, Mo., on Jan. 8 postponed action on the substitute for the two bills looking toward the settlement of the United Railways franchise matter. They took no action because it was felt that the section of the ordinance governing the so-called mill tax was indefinite. Chairman Barney L. Schwartz and the other members of the committee wanted to confer with C. E. Smith, consulting engineer for the city, and the law department, before agreeing to report the substitute. The substitute provides for the payment of all due portions of the mill tax within one year after the proposed franchise is accepted by the United Railways. The committee was concerned about the matter of the interest payments. The discussion lasted three hours.

On Jan. 10 the committee decided by a vote of six to one to require the United

Railways to pay 6 per cent interest on deferred payments of the mill tax and to require it to be paid in not more than five years. The committee voted to reject a proposed amendment eliminating a board of control and transferring its duties to the board of public service. The board of control clauses will be retained in the bill. The bill virtually was completed on Jan. 10 except for clauses providing extensions and betterments in service.

OTHER MEETINGS NECESSARY

It appeared likely on Jan. 10 that the bill would be completed by the committee in time for reference on Jan. 14 to the board of public service for its recommendations. The program was upset, however, by the turmoil that prevailed at the adjourned hearing. Among those who attended the session was a delegation from the Central Trades and Labor Union. Denials were made by the union men of any attempt on their part to storm the meeting, but the confusion was so great that the committee failed to agree on the amendments, and other meetings will have to be held. It was expected that the committee would convene again on Jan. 18.

Montreal Report Ready

The Montreal Tramways Commission, appointed by the Provincial government a year ago to draft a new franchise between the city of Montreal and the Montreal Tramways, will place its findings before the Quebec Legislature in a few days.

The commission values the investment in the tramways company at \$38,000,000 and will allow 6¼ per cent on that amount as earnings. The city of Montreal is to receive \$500,000 annually when returns are made. From profits left over, the commission suggests that after the 6¼ per cent dividend and the city's \$500,000 have been deducted, the remaining profits be divided as follows: City of Montreal one-third and the company one-third and the remaining third to go to a fund to reduce the cost of transportation to the public. Instead of selling tickets to passengers at six for 25 cents, a straight 5-cent fare will be charged with full transfer privileges to any part of the city, a ride of 13 miles.

An allowance of 6¼ per cent on the \$38,000,000 valuation will net the company \$2,375,000 clear, and net earnings after taxes, worked out on the basis of the commission's report, would be \$3,025,327, the company's percentage \$2,375,000, and the city of Montreal's share \$500,000, which would leave a balance of \$150,327.

Chicago Suffered

Papers Pay Tribute to Surface Lines, But Deplore the Lack of Subway Accommodations

Renewed interest in subways for Chicago is a development of the great snow storm and blizzard which for more than a week demoralized surface transportation and threw an unusual burden on the elevated roads. Almost without exception the local newspapers paid editorial tribute to the ceaseless activity of the Chicago surface lines which by use of sweepers and plows provided highways for the relief of a storm-bound people. Following this comment were other editorials pointing to an object lesson of Chicago's experience, namely, that subways would make the city independent of blizzards.

NEWSPAPER COMMENT

The *Tribune* said:

"It is safe to say that 50 or even 75 per cent of this interference would not have occurred if Chicago had a subway system, and we are not speaking of a comprehensive system, but a few main line tubes extending 2 or 3 miles outside of the loop. And a like improvement, even though not so great, could be accomplished in normal times.

"Straphangers should reflect that we could have such a subway now except for one thing. That thing was the opposition of misguided civic organizations and self-appointed watchdogs of the treasury. They were so fearful that the traction companies might get a nickel to which they were not entitled or even an extra nickel beyond bare subsistence, that they defeated every project so far submitted."

The *Examiner* said:

"Once more the citizens of Chicago have had an object lesson of what they are losing by putting off the construction of city-owned rapid transit subways. . . . Chicago will never know what real transportation means—in speed, in regularity, in comfort, at all seasons of the year, and under all weather conditions—until it builds and operates rapid transit subways."

A pending plan for transportation improvement in Chicago includes building of subways and extension of elevated lines. This program was halted in the State Legislature last summer through a difference of opinion over the character of enabling legislation that should be provided. Negotiations were reopened recently in the City Council, and while all parties realize the impossibility of raising the necessary millions of dollars during war times, it is expected that discussions will continue so that an agreed plan will be ready for popular vote when conditions improve.

Brazilian Electrification

Representative of Government Favors Immediate Work on Rio de Janeiro Suburban Lines

Dr. Cezar Rabello, a Brazilian engineer, member of the American Society of Civil Engineers and the American Institute of Electrical Engineers, and director of the Cia Brasileira de Energia Electrica, sailed recently for his home in Rio de Janeiro.

The Cia Brasileira de Energia Electrica is one of the most important central station holdings in Brazil. It operates hydroelectric plants in the states of Rio de Janeiro and Bahia. Dr. Rabello has been the leader of both projects, and while in the United States placed the final order for the Bahia project with the General Electric Company. This plant will have an ultimate capacity of 30,000 kva. The Rio de Janeiro plant has equipment for 15,000 kva. installed.

The Brazilian government chose Dr. Rabello chairman of a commission to report on the electrification of the Estrada de Ferro Central do Brazil, the most important steam railroad of Brazil owned by the federal government. At present the project is to electrify only the suburban district of Rio de Janeiro. At the end of this district the road goes over a range of mountains with heavy grades, very sharp curves and many tunnels. Dr. Rabello visited the Chicago, Milwaukee & St. Paul; Butte, Anaconda & Pacific; New York Central; New York, New Haven & Hartford and Pennsylvania Railroad electrifications. He is returning to Brazil very much impressed with what he saw and learned and enthusiastic about the courtesies he received from the different men he came to know.

Emphasis is laid by Dr. Rabello on the fact that the system of propulsion selected for Brazil should be the simplest, due to the distance from the manufacturer or the source of repair parts. He feels that the time to begin the work in Brazil is now because successful operation is assured by the results in the United States, and even with the present abnormal prices of material a large saving could be effected, due to the high price of coal. Dr. Rabello inclines to the opinion that the railroads in Brazil should follow the lead of the Chicago, Milwaukee & St. Paul Railway and buy power rather than attempt to generate it.

Colonel Kealy Raps Industrial Slacker

Philip J. Kealy, for several months on leave of absence from his position of president of the Kansas City (Mo.) Railways, returned to active management on Jan. 14. Colonel Kealy issued a statement to the employees and to the public in part as follows:

"These are abnormal times. Our nation's existence is threatened. Extraordinary economic situations exist. Our business is seriously affected, for the reason that no business has escaped. But the more abnormal the situation,

the greater should be our efforts and resolutions to overcome it.

"To bring this about, it is necessary that every man do his duty. We are all public servants, our company is a public service corporation. Service cannot be given the public unless every employee is on the job regularly. He must not be a fair weather servant of the public, or a fair weather employee of this company.

"He who fails to report for duty, unless actually sick is a slacker, a worthless, disloyal employee—a faithless public servant.

"This company wants no slackers; it will not tolerate them. If there be those in the service of this company who feel they cannot co-operate toward this end, the time for them to get out is now. The man who sticks to his post of duty is a valuable public servant and will be so treated.

"This is no time for agitators or trouble makers. The kaiser's allies have no place in this country. The vast majority of the employees are loyal but a few disgruntled ones are placing all of us in a bad light.

"Those of us who are not permitted to join the men in the trenches should be soldiers at home, and the only way we can fulfil this obligation is by doing our work regularly as civilians whether that work be on the street cars or in some industrial institution."

Debate M. O. Plan

East San Francisco Bay Cities Plan to Study the Matter of Taking Over Electric Railways

The formation of a public utilities district for the acquisition of the electric railway system which serves the several cities on the east side of San Francisco Bay was the subject of discussion at a meeting in Berkeley on Jan. 14, attended by 200 citizens of Alameda and Contra Costa Counties. The sentiment of the meeting is reported to have been very strongly in favor of public ownership of the railway system and there was hearty indorsement of the plan to investigate the matter.

Mayor Samuel C. Irving of Berkeley was named chairman of the committee, and he was empowered to appoint five other members representing the entire East Bay region, to study the plan in further detail and lay out the formal organization. E. W. Wilson, secretary Alameda County Tax Payers' Association, was elected secretary of the committee. The other members were to be selected later.

\$1,000,000 Fire in Buffalo

The Forest station of the International Railway, Buffalo, N. Y., together with 100 cars, was destroyed by fire on the night of Jan. 23. The total loss is unofficially estimated at \$1,000,000. The company operates about 400 miles of electric railway. Its equipment as reported in the last edition of the "McGraw Electric Railway List" consisted of 945 motor cars and 93 other cars.

Toledo Men Insistent

Apparently Unwilling to Accept Anything Less Than a Ten-Cent Advance in Wages

At a recent conference between Frank R. Coates, president of the Toledo Railways & Light Company, Toledo, Ohio, and representatives of the motormen and conductors the unwillingness of the men to accept an increase in wages of less than 10 cents an hour was brought out. Mr. Coates said that the company could not afford to increase the wages of its men under the present rate of fare. He promised to consider the matter and give an answer later.

H. K. Apple, representing A. L. Faulkner of the Federal Department of Labor, and Mayor Cornell Schreiber were present at the conference. Henry L. Doherty could not attend. Mayor Schreiber stated that the dispute would have to be settled speedily. He had formulated a plan for a complete government investigation. Mr. Apple said the government would probably not furnish the expert accountants needed for such an investigation. President Coates could not say at the time whether the company would be willing to bear the expense.

Mr. Coates asked the representatives of the men what would be the smallest increase they would accept. The reply was "nothing less than 10 cents an hour." Mayor Schreiber then said:

"Owing to the fact that you have a contract, it should be observed as much as possible. If the present wage is insufficient it should be increased only so much as is necessary for a living wage. We are here representing three interests. Mr. Coates represents the company; you men represent the union and I represent the public who use the cars. My chief purpose is to see that the public does not suffer through this controversy. I should like to see it settled as quickly as possible and will do everything I can to make a settlement that is agreeable to both parties."

A communication is expected from Mr. Doherty, chairman of the board of directors of the company, stating when he can meet with the representatives of the men and the government to discuss the matter.

AUDIT DECIDED UPON

On Jan. 16 it was decided to audit the books of the company to learn whether it will be possible to increase wages. Nau, Rusk & Sweringen, Cleveland, were selected to do the work. The arrangement, however, is still subject to the approval of Mr. Doherty.

Mr. Coates told those who attended the conference on Jan. 16 that the days of 3-cent fare were past. Where the rates are increased to meet abnormal conditions, however, they may be lowered when these conditions no longer exist.

Nau, Rusk & Sweringen began an examination of the books of the company on Jan. 21 to determine the increase in the cost of operation.

Freight Tunnels for Hudson

They Provide Only Efficient Solution of Congestion Problem, According to Improvement Commission

The construction of at least one tunnel under the Hudson River for railroad and vehicle traffic will undoubtedly be urged upon the State of New York at the present session of the Legislature. This was indicated by remarks made on Jan. 19 by William M. Van Benschoten, chairman of the Commission on West Side Improvement. Mr. Van Benschoten said that the people of Greater New York were now paying a severe penalty for "having permitted politics, prejudice, personalities, indifference and incapacity to prevent in the past the development of adequate and efficient freight terminals, as well as up-to-date and progressive transportation facilities between New York and the New Jersey shore." He said further:

"We must have adequate freight terminals and adequate and efficient transportation facilities between the city and the lines at the Jersey shore which reaches out to the source of supplies for the city. Connecting bridges have been advocated. The railroad companies cling to their lighters and barges and car floats, but I believe that the only efficient, at all times adequate and proper solution of the Jersey-Manhattan transportation problem is the tunnel, free as it would be from the fiercest storm or the coldest weather.

"With such under-river connections a proper development of terminal facilities in our own Manhattan, and with, perhaps, as the time goes on, a further extension to the other boroughs of the city, would guarantee the people against repetition of the conditions which now exist. In this connection it should not be forgotten that the inadequate terminal facilities in the city are a burden on all the railroads stretching across the continent."

War Committee

National Body Organizes So Commissions Can Work Together to Help the Government

James Blaine Walker, secretary of the National Association of Railway and Utility Commissioners and of the Public Service Commission for the First District of New York, on Jan. 19 said that part of the program of the association for assisting the government to co-ordinate the work of the public service corporations and insure maximum co-operation provided:

"To obtain and transmit to each state commission from official sources information in general war matters affecting the commissions.

"To answer inquiries and ascertain the facts for the state commissions in matters of general war interest affecting them.

"To advise with the various commissions as to how they can give the most effective assistance to their states and the nation during the war."

A special war committee has been

appointed which will serve as a link between the federal and state governments. This committee consists of Max Thelen, California; Ralph W. E. Donges, New Jersey; Joseph B. Eastman, Massachusetts; Frank H. Funk, Illinois; Travis H. Whitney, New York, and Edward C. Niles, New Hampshire.

Mr. Walker said:

"The movement includes the railway commissions, and these have been working with public service commissions. There have been many conferences to learn what can be done in a constructive way to help the states and the nation. In these conferences consultations have been had with Governors, the State Council of Defense, and other officials and organizations.

"Much of the work done so far has been of a confidential character, and all of it, in fact, is so bound up with matters under national control that a revelation of our activities must not be made at this time. Just what each state commission should do in the matter of helping the government has been carefully set forth and transmitted to the chairman of each of the commissions. This assures uniform activities, and the danger of some of us working at cross purposes is thus removed."

Motor-Bus Petitions Decided

Dissenting Opinion Draws Distinction Between Regulation for jitneys and Electric Roads

The Public Utilities Commission of Illinois has granted the Chicago Stage Company a certificate of convenience and necessity to operate motor buses upon the boulevards and streets of the South Side and denied a certificate to the Chicago Motor Bus Company on the ground that the Stage Company is in a position to render adequate service. Commissioner Shaw dissents from the majority opinion, saying:

"In general, I believe it may be said that regulation contemplates that, as long as a utility renders adequate service at reasonable rates, it should not be subject to competition for the reason that when adequate service is rendered at reasonable rates a duplication of plant and facilities is an economic waste which, in the end, the general public must suffer. However, there is a vast difference between a public utility operating motor buses and a public utility operating an electric railway, a gas plant, an electric plant, a water plant, or a steam railway. The equipment of a motor bus company consists in the main of individual buses to the number required, general offices, and a place to house and repair the buses. It has no large investment in generating plants, distribution systems, tracks, etc.

"Therefore, in my mind, a public utility operating motor buses is not comparable with other utilities subject to regulation. It appears to me that the motor-bus business is more nearly comparable with the taxicab business, over which this commission has heretofore held it had no jurisdiction."

News Notes

Water-Power Bill Already Drafted.—Representative Sims, chairman of the new water-power committee of the House, intends to call a meeting of the committee within the next day or two. The bill which the committee will consider is already drafted and embodies the administration's program for developing and conserving the water-power resources of the country.

Commission Functions Unchanged by Federal Order.—It was decided at a conference in Washington between representatives of the National Association of Railways and Public Utility Commissioners and Director-General McAdoo that the functions of the state railway and the public utility commissions throughout the country before the government operation of the railroads will remain unchanged.

Cleveland Commission Meets.—A meeting of the Cleveland Street Railway Commission was held in the office of Otis & Company on Jan. 8. Data were submitted by City Engineer Hoffman and Street Railway Commissioner Sanders. Chairman Charles A. Otis said that the members of the commission would probably visit other cities to make a study of the subway problem. It will be some time before any definite recommendation can be made.

M. O. Bond Bill Recommended for Passage.—The utilities committee of the City Council of Seattle, Wash., has recommended for passage a bill submitting a general bond issue to the voters at the general election on March 5 for the construction of an elevated railway on Washington Street, Railroad Avenue, Whatcom Avenue and Spokane Street, extending from First Avenue south to the west waterway. Twenty-year bonds, bearing interest of not more than 5½ per cent, are provided for in the bill. Interest on the bonds is to be provided for in each annual tax levy, and provision is to be made at the beginning of the fifteenth year for the retirement of the bonds at maturity.

Severe Snow in Texas.—The recent heavy snowfall in Texas caused great inconvenience and in some cases total interruption to city and interurban railway traffic. The Dallas Railways was forced to suspend traffic on some of its lines on account of snow and ice on the tracks, and the Texas Electric Railway, the consolidated Strickland lines, was forced to suspend operation over an 8-mile stretch of its track near Milford. Cars were operated from Dallas to the impassible snow drifts and also from Corsicana to the snow barrier. Traffic was interrupted for nearly forty-eight hours before the line was opened. The company did not attempt to transfer passengers and freight over the break.

Accident to Power Plant.—A goose-neck in a high-pressure steam line connected to four boilers in the plant of the Kansas City (Mo.) Railways, burst on Sunday, Jan. 13. The entire plant was filled with steam. Two men who could not escape were killed. Firemen and engineers cut the fires and ran. The steam was reduced sufficiently after two hours for the workmen to return, make the repairs and restore operation. The engineers who investigated the accident reported that the piping had adequate flexibility, but that the immediate filling of the boiler room with steam prevented those on duty from ascertaining the source of the trouble and closing the broken valve. Electric railway service was suspended for three hours. Electric lights outside the business district of the city were cut off for three hours longer.

M. O. Bill Again Referred.—The bill providing for municipal ownership of public utilities which was introduced into the Legislature of New York by Democratic Leader Wagner with the approval of Mayor Hylan of New York City was taken on Jan. 17 from the public service committee and sent to the cities committee. When the Wagner bill was introduced in the Senate it was referred to the public service committee, of which Senator George F. Thompson, Niagara, who conducted the investigation into the Public Service Commissions, is the chairman. Senator Brown was absent when the bill went to Senator Thompson's committee, so he moved on his return to have the Wagner bill taken from the committee on public service and sent to the committee on cities, of which Senator George F. Argetsinger of Rochester is the chairman.

Advised Against Acceptance of Valuation Contract.—City Attorney Callaway, of Dallas, Texas, has advised the City Commissioner not to accept the contract entered into between the Dallas Railway and the Northern Texas Traction Company for the valuation of the Stone & Webster properties in Oak Cliff. The city attorney says that if the city accepts the contract it becomes irrevocably bound by the findings of the engineers employed to make the valuation. It is maintained that under the contract the Dallas Railways could add any expense incurred in connection with the valuation to the property value to be used as a basis for rate-fixing under the service-at-cost franchises. It is desired that a contract be framed providing that such expense shall be submitted to the Supervisor of Public Utilities of the city of Dallas for revision and approved before being added to the values.

Association Meeting Program

Central Electric Railway Association

The annual meeting of the Central Electric Railway Association will be held in the city of Dayton, Ohio, on Feb. 28.

Financial and Corporate

Depreciation Fund Case

New York Commission Upheld in Requiring 20 Per Cent Fund for Maintenance and Depreciation

An order issued by the First District Public Service Commission in February, 1912, directing the New York Railways to set aside each month 20 per cent of its gross operating revenues to provide for maintenance and depreciation must be obeyed. The company objected to the order and obtained a writ of certiorari from the Supreme Court, but the Appellate Division dismissed the writ on Jan. 18 and affirmed the order.

The order was made after the reorganization of the old Metropolitan Street Railway. The new company, the New York Railways, objected to the 20 per cent requirement on the ground that it was not always necessary to use so much for the purposes designated. The company also insisted that its directors were the proper persons to determine the amount of the depreciation reserve fund and not the commission.

The present decision, besides sustaining the commission in this particular case, makes it clear that the law has vested the commission with full powers to regulate the methods of public service corporations. Part of the opinion of the court reads:

"If this power be denied the directors are at liberty to divert this fund, necessary for the maintenance of the value of the security and also necessary for adequate service to the traveling public, to the payment of the interest on the income bonds. When, therefore, in the course of time it becomes necessary to replace obsolescent and depreciated equipment, what is the situation created? No fund will have been created for that purpose. The commission is not authorized to assent to the issuance of new securities therefor. The necessary replacement cannot be made for lack of funds and of ability to procure them. The corporation becomes unable to perform its public functions, and corporate death is inevitable. Another reorganization becomes necessary, with the consequent material impairment of securities.

"Even if power existed to raise money for replacement by the issue of new securities the fatal ending is only postponed. If the Legislature has left this loop-hole in its scheme for the protection of the security holders, it has made a serious blunder. Such a fate has befallen too many of these corporations, and it was largely to prevent just such catastrophes that this commission was created. The court should not so construe the powers given as to permit the very evils which the Legislature has sought to remedy."

Seeking to Save Road

Residents Along Line Sold for Junk Voluntarily Pay Seven-Cent Fare to Increase Revenues

Efforts are being made to save the Taunton & Pawtucket Street Railway (Bristol County Street Railway), Taunton, Mass., from the scrap heap. The road was sold recently under foreclosure to Swift, McNutt & Company for junk. In the interim between the sale and its confirmation by the court the people who would be discommoded by the removal of the line have injected themselves into the situation in an effort to continue the property as a going concern. Confirmation by the court was set for Jan. 21.

As a first move to prevent abandonment the Superior Court on Jan. 11 refused to allow the petition of the receiver to discontinue operation. It was promptly arranged, however, that all trips regarded as unnecessary be abandoned at once. Then an appeal was made that patrons of the line voluntarily pay a 7-cent fare. At Attleboro on Jan. 15 general committees met to discuss the future of the road. At that time Attorney Burke presented figures to show that the fare increase during the last five days had netted 37 per cent increase, and he figured that the increase in revenues under the new fare would be \$10,000 for the year. Plans were discussed for a reorganization of the company by having the residents along the line take stock.

The advance in the fare unit from 5 cents to 7 cents makes the fare between Attleboro and Taunton 28 cents instead of 20 cents. In the new schedule 2 cents is charged for transfers.

Gary Issues Approved

The Indiana Public Service Commission has authorized the Gary Street Railway, the successor to the Gary & Interurban Railway and the East Chicago Street Railway, to issue \$365,000 of 6 per cent non-cumulative preferred stock at 90; a like amount of common stock at 75; \$125,000 of 5 per cent first mortgage bonds at 85 to pay for proposed extensions, and \$800,000 of 5 per cent second mortgage bonds at 75. The company asked permission to issue \$437,500 of preferred stock, \$1,500,000 of common stock, \$350,000 of first mortgage bonds as part of a proposed issue of \$2,500,000 and \$800,000 of debenture bonds. It was represented in the company's petition that the stock, the debentures and \$125,000 of the first mortgage bonds were to be used in paying for the city railway systems and the interurban lines operating between Gary, East Chicago and Hammond. The interurban system consists of 33 miles of track.

War Direction of Security Issues Asked

Investment Bankers Favor the Creation of Semi-Official Board—Corporate Financing Cut, But No City and State Retrenchment

The Board of Governors of the Investment Bankers' Association of America has formally approved a report of a special committee which had been studying the question of supervising security issues. The committee suggested that a semi-official board be created and charged with supervision of the issuance of corporate, state and municipal securities for the duration of the war and the period immediately following its conclusion.

The special committee, which was appointed at the October convention of the association, consisted of Allen B. Forbes, New York, chairman; William R. Compton, St. Louis; M. P. Hallowell, Boston; H. C. McEldowney, Pittsburgh, and H. L. Stuart, Chicago. Copies of the committee's report have been forwarded to William G. McAdoo, Secretary of the Treasury, and Paul M. Warburg, Governor of the Federal Reserve Board.

WAR FINANCING DIFFERENT HERE

After surveying war financing in England, France and Germany, the committee said:

"Our situation is different. The United States, to speak financially, is called upon to be self-containing and self-sustaining from the start. Our own people must take a practically continuous issuance of federal government securities. In addition, we must finance such corporate, state and municipal needs as are essential. This, then, seems clearly to require the handling of the situation on a broader basis than has been necessary in England."

The accompanying data were presented by the committee to indicate the amount of financing in the United States for 1916 and 1917. Totals were also given for the last three-quarters of each year, approximately including the time since the entry of the United States into the war. Foreign government issues were excluded.

RECORD OF FINANCING IN 1916 AND 1917

	Railroads	
	1916	1917
April:		
Twelve months.	\$368,800,000	\$440,800,000
Nine months.		
April-Dec. . . .	192,500,000	157,900,000
	Industrials	
Twelve months.	\$951,400,000	\$728,500,000
Nine months.		
April-Dec. . . .	655,000,000	457,000,000
	Public Utilities	
Twelve months.	\$541,200,000	\$406,800,000
Nine months.		
April-Dec. . . .	400,400,000	218,600,000
	Total Corporate Financing	
Twelve months.	\$1,861,600,000	\$1,576,300,000
Nine months.		
April-Dec. . . .	1,248,100,000	833,600,000
	State and Municipal (Permanent Loans.)	
Twelve months.	\$497,400,000	\$475,800,000
Nine months.		
April-Dec. . . .	376,900,000	371,600,000

The figures compiled, the committee said, indicate the extent of the decline

in corporate financing since the United States' entry into the war. Of the amount of financing accomplished, a large part represented the refunding of maturing obligations or financing which would be considered essential under present circumstances.

In the committee's opinion, this record clearly reflects the strong regulatory power of the securities market upon new flotations. Although the cost of materials and labor has had a restraining influence, the market difficulties have been by all odds the most important factor in the decline of the total amount of these issues during the last three-quarters of 1917. It seems a fair inference that this factor will continue to have its regulatory effect, perhaps as time goes on, to an increasing extent.

The report states that it is apparent that there has been no material decrease in the issuance of state and municipal securities since this country's entrance into the war. In this connection, it was suggested that the President or the Secretary of the Treasury call the attention of the states and municipalities to the urgency of issuing securities only to meet the most pressing demands.

SUPERVISORY BOARD NEEDED

The report says in regard to the recommendation for a board to supervise the issuance of securities:

"The moving thought in this recommendation is, first, that the financial activities of corporations, states and municipalities could be better limited and directed by a board than could be accomplished through market conditions alone or through individual or decentralized effort. Secondly, there are urgently needed results to be attained through the constructive as well as the regulative and restrictive work of such a board.

"It is recommended that the membership of this board consist of two classes, namely, (1) representatives of that department or departments of the government most directly concerned in the handling of this situation, and, (2) business men and bankers from private life who are experienced in dealing in a comprehensive way with matters of industry and finance—especially in respect to the issuance of securities. The board should be closely associated with the Treasury Department—in particular with the Federal Reserve Board—and appropriate appointments should be made from these quarters. It may prove advisable, on account of the scope of the board's duties as finally determined, to have among its membership a representative of that branch of the government then in control of war supplies, and also a representative of the federal agency in charge of corporations engaged in interstate commerce.

"The board at Washington should be assisted by appropriate local boards appointed with especial reference to geographical considerations. Familiarity with local conditions would be essential to the proper handling of the subject. It is believed that the Federal Reserve Districts would form advantageous subdivisions for this purpose.

"In respect to the powers and duties of the central and local boards, it is the view of this committee that not only the general policy should be directed by the central board at Washington, but that sufficient central control should be exercised to see that decisions on applications arising in the various local districts are governed by a uniform policy. Moreover, it might be advisable, or even necessary, in respect to some classes of corporate financing, to have the central board decide if the needs of the government, in connection with war supplies, for instance, would make it advisable to allow the concern in question to do new financing.

"It is believed by this committee to be more consonant with conditions existing in the United States that such a board should act under informal rather than formal statutory authority. Undoubtedly, under an informal plan, the board could more readily meet changing conditions."

Financial News Notes

Rehearing Asked in Suspension Order.—The Commonwealth Trust Company, St. Louis, Mo., has asked the Public Utilities Commission of Illinois for a rehearing in the case of the Alton & Jerseyville Railway, Alton, Ill., authorized by the commission to suspend service on Feb. 1 between Alton and Jerseyville and to dismantle the railway property.

Receiver Sought for Aurora-DeKalb Line.—Application has been made to the Circuit Court of Kane County, Ill., by a Chicago bank for the appointment of receivers for the Chicago, Aurora & De Kalb Railroad, operating about 30 miles of track between Aurora and DeKalb. It is reported that interest is in default on a mortgage covering the property of the railway, of which the Chicago institution is trustee.

Time for Bay State Deposits Extended.—The protective committee, representing the holders of the 4 per cent bonds due on July 1, 1954, both of the Boston & Northern Street Railway and the Old Colony Street Railway, has extended to Feb. 15 the time for depositing the bonds with the Boston Safe Deposit & Trust Company, depository. The chairman of the committee is John R. Macomber.

Bondholders Organize.—A committee consisting of John McCarthy, Danbury, Conn.; Charles E. Graham, New Haven, Conn., and P. LeRoy Harwood, New London, Conn., has been formed with Mr. McCarthy as chairman to represent the holders of the first and refunding bonds of the Danbury & Bethel Street Railway, placed in the hands of Judge J. Moss Ives as receiver late last year.

No Dividend on Common Stock.—The directors of the Columbus Railway, Power & Light Company have declared the usual quarterly dividend of 1¼ per cent on the "B" preferred stock, payable on Feb. 1, but determined that the conditions do not warrant the declaration of a dividend on the common stock. The reasons for this action are principally excessive costs of fuel, supplies, metal and practically everything used.

Hearing Jan. 28 on Receivership Plea.—The application for the appointment of receivers for the United Railways, St. Louis, Mo., filed recently by Ephraim Caplan, attorney for John W. Seaman, New York, N. Y., has been docketed for a hearing on Jan. 28 by Judge Dyer in the United States Circuit Court. Mr. Caplan visited Judge Dyer a few days ago and requested a temporary injunction to prevent legal action on the part of the directors and the bondholders of the company until after the hearing. The Judge refused to act until after the hearing.

Cancellation of Mortgages Sought.—Former Governor Judson Harmon, on behalf of J. M. Hutton, Leo J. Van Lahr, Otto Armleder, Claude Ashbrook and Edgar Friedlander, has asked the Ohio Public Utilities Commission to authorize the Cincinnati & Dayton

Traction Company, which recently took over the old Cincinnati, Dayton & Toledo Traction Company, Hamilton, Ohio, to issue \$1,250,000 of common stock, and \$4,500,000 of twenty-year 5 per cent bonds to be sold to cancel mortgages on the property acquired by the new company.

Deposit Time Extended.—The committee representing the holders of the Lafayette & Logansport Traction Company's first mortgage 5 per cent bonds of 1936 announces that the limit for the deposit of bonds under the protective agreement, which expired on Jan. 15, has been extended, with the understanding that it may be terminated at any time. The Logan Trust Company, Philadelphia, Pa., is the depository. The Lafayette & Logansport Traction Company is included in the system of the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.

Petition for Receiver Filed.—A petition for a receiver for the Seattle, Renton & Southern Railway has been filed in the United States District Court in Seattle, Wash., by Charles M. Cook, Boston, Mass., who represents that he is the holder of \$10,000 of first mortgage bonds of the railway. He alleges conspiracy to deprive him of his rightful share in the reorganization of the company. The defendants named in the petition are the Seattle, Renton & Southern Railway, the First Trust & Savings Bank, Chicago; William R. Stirling, Burton Thoms and Louis K. Boisot, Chicago; William L. Elkins and Arthur Morton, Philadelphia, and the Seattle & Rainier Railway.

Spokane Valuations Compiled.—The Public Service Commission of the State of Washington has completed a valua-

tion of the Washington Water Power Company's city railway property in Spokane and its interurban lines, and also of the Spokane Inland Empire Railroad, including northern Idaho. Hearings for the taking of testimony will begin at Spokane on Feb. 4, the Idaho Commission sitting jointly with the Washington body. As compiled by the engineers of the Public Service Commission, but not adopted and authorized by the commission, the Washington Water Power Company's system, is valued at \$21,624,495 in Washington, and \$2,491,823 in Idaho, or a total of \$24,116,418. These figures are based on the cost of reproduction, and do not include valuation of power sites. When the official valuation is adopted, it will be used as a base for rate-making.

Dan Patch Line Awaits Washington Advice.—C. T. Jaffray, president of the First & Security National Bank, Minneapolis, Minn., who is chairman of the committee representing the holders of the bonds of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company, and one of the purchasers of the 14-mile cut-off of the road, said on Jan. 16 that nothing more could be done, either to scrap or reorganize the road, until a decision has been obtained from Washington with respect to the disposition to be made by the government of the so-called short-line railroads. He is quoted as follows: "If the short-line railroads are to be left out of it and concentration made on long lines, obviously the 'Dan Patch' will have little business. Mr. Marchand and Mr. Bratnower are in Washington and may be able to learn whether the 'Dan Patch' comes under the Director of Railways and what may be done with it."

Electric Railway Monthly Earnings

BATON ROUGE (LA.) ELECTRIC COMPANY						NEW YORK (N. Y.) RAILWAYS					
Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income	Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Nov., '18	\$20,518	\$9,907	\$10,611	\$3,611	\$7,000	1m., Nov., '17	\$998,423	\$745,715	\$252,708	\$281,139	\$19,691
1 " " '17	18,680	8,527	10,153	3,540	6,613	1 " " '16	837,383	697,405	139,978	278,824	\$76,272
12 " " '18	230,584	\$115,717	114,867	42,662	72,205	12 " " '17	5,387,330	\$3,935,109	1,452,221	1,408,747	\$292,486
12 " " '17	209,545	\$102,128	107,417	41,623	65,794	12 " " '16	4,447,489	\$3,386,508	1,060,981	1,410,686	\$780,416
BROCKTON-PLYMOUTH STREET RAILWAY, PLYMOUTH, MASS.						PADUCAH TRACTION & LIGHT COMPANY, PADUCAH, KY.					
1m., Nov., '18	\$8,511	\$9,858	\$1,347	\$1,286	\$2,633	1m., Nov., '17	\$25,696	\$19,223	\$6,473	\$7,927	\$1,454
1 " " '17	8,507	9,769	1,262	1,116	\$2,378	1 " " '16	26,100	19,883	6,217	7,246	1,029
12 " " '18	124,194	\$123,927	267	14,556	\$14,289	12 " " '17	303,661	\$231,561	72,100	89,478	\$17,378
12 " " '17	121,971	\$120,246	13,725	13,278	447	12 " " '16	311,625	\$208,633	102,992	86,845	16,147
CAPE BRETON ELECTRIC COMPANY, LTD., SYDNEY, N. S.						PENSACOLA (FLA.) ELECTRIC COMPANY					
1m., Nov., '18	\$42,612	\$28,256	\$14,356	\$6,468	\$7,888	1m., Nov., '17	\$32,129	\$18,647	\$13,482	\$7,825	\$5,657
1 " " '17	34,904	\$19,084	15,820	6,484	9,336	1 " " '16	21,151	\$13,698	7,453	7,726	\$273
12 " " '18	458,245	\$293,237	165,008	78,668	86,340	12 " " '17	342,220	\$198,055	144,165	93,503	50,662
12 " " '17	389,650	\$228,545	161,105	78,312	82,793	12 " " '16	277,192	\$155,688	121,504	91,894	29,610
COLUMBUS (GA.) ELECTRIC COMPANY						PUGET SOUND TRACTION, LIGHT & POWER COMPANY, SEATTLE, WASH.					
1m., Nov., '18	\$106,369	\$37,508	\$68,861	\$31,729	\$37,132	1m., Nov., '17	\$899,903	\$580,598	\$319,305	\$203,436	\$115,869
1 " " '17	87,021	\$31,903	55,118	28,521	26,597	1 " " '16	731,630	\$432,984	298,646	184,682	\$113,964
12 " " '18	1,076,629	\$408,472	668,157	355,848	312,309	12 " " '17	9,272,611	\$5,686,271	3,586,340	2,332,492	1,253,848
12 " " '17	867,196	\$347,933	519,263	343,726	175,537	12 " " '16	8,018,193	\$5,092,698	2,925,495	2,210,477	715,018
EASTERN TEXAS ELECTRIC COMPANY, BEAUMONT, TEX.						RHODE ISLAND COMPANY, PROVIDENCE, R. I.					
1m., Nov., '17	\$75,990	\$39,308	\$36,682	\$12,119	\$27,465	1m., Nov., '17	\$466,603	\$540,981	\$74,378	\$122,376	\$195,941
1 " " '16	78,859	\$38,362	35,497	9,622	25,875	1 " " '18	450,652	\$346,949	103,703	119,161	\$114,499
12 " " '17	928,068	\$512,588	415,480	134,441	\$297,874	11 " " '17	5,502,349	\$4,695,192	807,157	1,332,299	\$410,501
12 " " '16	820,296	\$440,086	380,210	107,245	272,965	11 " " '16	5,330,357	\$3,837,225	1,493,132	1,281,775	\$329,426
EL PASO (TEX.) ELECTRIC COMPANY						SAVANNAH (GA.) ELECTRIC COMPANY					
1m., Nov., '17	\$108,205	\$68,005	\$40,199	\$6,503	\$33,696	1m., Nov., '17	\$88,104	\$57,690	\$30,414	\$24,451	\$5,963
1 " " '16	99,883	\$66,104	33,779	5,269	38,510	1 " " '16	74,794	\$46,031	28,763	23,706	5,057
12 " " '17	1,292,396	\$739,758	502,638	65,835	436,803	12 " " '17	955,658	\$636,924	318,734	289,703	29,031
12 " " '16	1,094,844	\$645,869	448,975	57,974	391,001	12 " " '16	814,900	\$548,318	266,582	282,098	\$15,516
GALVESTON-HOUSTON ELECTRIC COMPANY, GALVESTON, TEX.						TAMPA (FLA.) ELECTRIC COMPANY					
1m., Nov., '17	\$196,272	\$122,876	\$73,396	\$38,328	\$35,068	1m., Nov., '17	\$78,087	\$45,153	\$32,934	\$5,334	\$27,600
1 " " '16	170,144	\$106,885	63,259	36,824	26,435	1 " " '16	80,779	\$44,027	36,752	4,464	32,288
12 " " '17	2,055,027	\$1,365,078	689,949	449,166	240,783	12 " " '17	1,004,802	\$559,024	445,778	55,401	390,377
12 " " '16	1,931,555	\$1,232,696	698,859	438,731	260,128	12 " " '16	961,411	\$526,540	434,871	52,391	382,480

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

Commission Against Women

**Opposes Their Employment in Seattle—
Favors Fare Increases to Provide
Proper Help**

The Public Service Commission of the State of Washington on Jan. 7 ruled that the Puget Sound Traction, Light & Power Company would not be permitted to employ women to take the places of men as conductors on Seattle cars at this time. The commission also ruled, however, that the company may have a hearing at once on a petition to advance its fares in Seattle from 5 cents to 6 cents. The commission said in part:

"The company, as other similar utilities, is limited in its income to certain sources. In our opinion, the only adequate source by which this revenue can be obtained is through an increase in fares. Eastern commissions, impelled by the increased cost of labor and material, have granted increased rates. In some instances these increases have been to 6 cents and in other instances to 7 cents. Only recently the Oregon commission, for similar reasons, increased the rate in Portland from 5 cents to 6 cents.

"We are satisfied that the women are willing to do their full share in the prosecution of the great conflict now pending. There is, however, some danger that their enthusiasm will lead them into certain callings inimical to the best interests of the State. There is much light manufacturing and many clerkships where they can be employed, and which are not at all harmful to their womanhood, and in many instances, in these lines, they can replace able-bodied men, who can become useful in the more public lines of employment.

"The highest attribute of woman is motherhood. This, in its fullness, includes health. If necessary to the preservation of these things we do not believe that anyone would question the propriety, if need be, of granting to the Puget Sound Traction, Light & Power Company a sufficient income by the increase of rates to make it possible for them to hire proper help.

"That the troublesome question of pay and working conditions may be overcome and an efficient service be maintained, we will entertain from the company an application for an increase of rates, and upon such application being made, will forthwith investigate to determine its condition that a proper order in the premises may be entered."

A. L. Kempster, general manager of the company, had asked the right to employ women on the cars, saying that it was becoming increasingly difficult to retain the men already in the employ of his company, and that it was a financial impossibility for a company

to compete with the wage scales paid in the shipyards. Protest against the employment of women was made by organized labor, through the Central Labor Council.

The officials of the company announced at the conclusion of the hearing that they would take no further steps looking to the employment of women on the cars. They would not say that the company at this time would take advantage of the other alternative offered, that of asking for a 6-cent fare.

Fare Request Put Off

**Des Moines City Railway Will Not Ask
for a Straight Five-Cent Fare
at This Time**

The Des Moines (Iowa) City Railway has temporarily, at least, dropped its plan to petition the City Council for a rate increase. The company desired to put fares on a straight 5-cent basis instead of six tickets for a quarter, as provided in the franchise. As a preliminary step in the campaign the company offered a wage increase to its employees averaging 2 cents an hour, with the inferred understanding that the men would work for the increase in fare when the matter was submitted to a vote of the people.

The present agreement between the company and the men does not expire until March 1, 1919, and while the men had no desire to break the agreement they felt that in view of the greatly increased cost of living since the contract was signed they were entitled to an increase. Emil G. Schmidt, president of the company, was inclined to agree with them, but advised that it was impossible for the company to assume the additional \$60,000 which the wage increase would entail without an increase in fare. The company's proposition was submitted to the men for a referendum vote and was defeated, so for the present at least no steps will be taken on either request for an increase.

Women Conductors for St. Louis

The United Railways, St. Louis, Mo., has its first women conductors in training at the Newstead carhouse, where special quarters have been fitted up for them, along with a rear platform and trailer entrance and vestibule in the school room. George Hart, instructor of conductors, is teaching the class. A majority of the twenty-odd students are wives or relatives of employees. The training course will cover sixteen days, dating from Jan. 7. Before the students began to receive instruction they were addressed by President McCulloch, Superintendent Cam-

New Orleans Report Discussed

**Antiquated Franchises Result in Waste
of Service—Company Operates Best
When Free of Restriction**

The report on railway operation in New Orleans, La., made last year by James E. Allison, St. Louis, Mo., has been discussed recently before the transportation committee of officials and citizens. Mr. Allison said that he found a great waste of service due to antiquated franchises, dating back to the days of competing city railways, each of which was obliged to traverse the business section. He repeated verbally his formal recommendations that this waste be eliminated, and the resulting economies divided between the traveling public and the railway, giving the former better service at rush hours.

Mr. Allison modified his recommendation to the New Orleans Railway & Light Company to buy fifty cars. He doubted whether the company could get the cars now—or if it could, whether it could get fifty at present prices of steel, for the amount the company had agreed to spend—between \$250,000 and \$500,000—on betterments of service.

In response to questions, Mr. Allison said he had made no attempt to decide on what basis division of any savings should be made between the company and the public. He had made no study to determine whether the company was getting a proper return on its investment, nor any valuation of its property. Nor had he made any study of the present transfer system. He said that a passenger should be able to reach any point in the city from any other point without paying two fares. The company should be safeguarded against the use of a transfer to make two trips.

FORMER MANAGER SLOAN'S IDEAS

M. S. Sloan, former manager of the railway department of the New Orleans Railway & Light Company, was another of those who appeared before the committee. Mr. Sloan agreed with Mr. Allison that no headway requirements should be placed in the new "blanket franchise" if one was obtained from the Legislature in place of the present collection of overlapping and obsolete franchises. Mr. Sloan said that Mardi Gras was the only day in the year when the railway system of New Orleans was operated as it should be. On that day the company was able to handle the crowds expeditiously because it could ignore the franchises and route cars in the interest of efficiency and service alone.

eron and Mr. Crafton. It was made clear that their employment was distinctly a war measure. They will be called conductors and not "conductresses" and, receiving the same pay per hour as the men, they will live up to the same rules and receive the same consideration as the sterner sex. The members of the first class will be put on trailers on the Page line.

Buffalo Traffic Recommendations Accepted

International Railway and City Expert Work
Together to Better Service

Many of the recommendations embodied in the first two reports of John C. Brackenridge, New York, who has been engaged by the City Council of Buffalo, N. Y., to make a survey of traffic conditions on the lines of the International Railway, have already been put into effect by the company. Ten lines have been rerouted, and E. G. Connette, president of the International Railway, has agreed to co-operate with Mr. Brackenridge and the municipal electric railway committee with the view of carrying out additional recommendations made by them.

Among the most important recommendations made by Mr. Brackenridge are the staggering of the hours of employment at the large industries; the immediate development of the passenger service of the belt line of the New York Central Railroad around the city; the continued co-operation of the police department in keeping vehicular traffic off the electric railway tracks and prevent overcrowding; construction of parallel lines in streets through congested districts and reorganization of the company's car repair and maintenance departments.

STAGGERED WORKING HOURS SUGGESTED

Mr. Brackenridge considers the staggering of hours of employment at the large industries in the Hertel-Elmwood Avenue section would be an important factor in reducing much of the present congestion, but says that the employment of almost 45,000 workers in this industrial section is a very great transportation problem, and he therefore recommends that the New York Central Railroad be required to increase its belt-line service between 5 a.m. and 7 a.m. and 4 p.m. and 6 p.m. He believes that an increased belt-line service on two railroad tracks now lying idle would greatly relieve the traffic problem from the industrial district. Mr. Brackenridge said that the double belt line operating for a distance of 15 miles around the city would afford permanent relief that could be obtained in no other way.

By staggering the hours of employment, Mr. Brackenridge believes that the morning and evening peak loads of power consumed by the company would be very greatly reduced for both the morning and the evening rush period. He also said that the tripper cars instead of making one trip as at present could make two or three trips, depending upon the length of the run, making available about 130 cars for additional service.

Telegrams were sent by Mr. Brackenridge to electric railway presidents and managers in more than a score of cities asking for information as to steps they had taken to have large industries stagger the hours of employment. John J. Stanley, president of the Cleveland (Ohio) Railway, replied

that in general the hours of labor were one-half hour or one hour in advance of commercial hours, and that the city railway commissioner in co-operation with the Chamber of Commerce, was working on a plan to stagger by sections or line or employment. M. C. Brush, president of the Boston (Mass.) Elevated Railway, replied at considerable length. He had evidently given the subject much study. Replies were also received from the American Electric Railway Association and electric railway companies in Pittsburgh, Baltimore, Philadelphia, Kansas City, St. Louis and Cincinnati. In each instance efforts were being made by the railways to secure the co-operation of local commercial associations to stagger the hours of employment.

INDUSTRIES ASKED TO HELP

President Connette of the International Railway and Vice-President Dickson are now making efforts to secure the co-operation of the Pierce-Arrow Motor Car Company, the Curtiss Aeroplane Company and other large war industries to stagger the hours of their employees. The Chamber of Commerce has started to investigate the problem and the municipal electric railway committee ap-

pointed by the Mayor has secured the co-operation of some factories.

Accepting the recommendation which urged the police department to keep vehicular traffic from the company's tracks, the chief of police has detailed more than two score policemen to patrol the company's tracks on various lines and keep them clear for the quick operation of cars. Traffic officers have also been stationed at congested intersections to prevent overcrowding and to keep the cars moving and prevent congestion and bunching. This movement on the part of the police has reduced to a minimum traffic delays due to "track-hogs."

Before presenting his second report, Mr. Brackenridge made an investigation of conditions in the company's car repair departments, and in his report covering this condition he praised the efficiency of the reorganized departments. He described in detail the company's efforts at the various carhouses to make quick repairs on cars, and told of the manner in which the company had improved its facilities for the quick repair of cars. Mr. Brackenridge declared that the company was now equipped to repair cars faster than they become crippled. He recommended that the company make daily reports to the Mayor of the number of disabled cars and of the progress made in repairing them, and that the repair gangs be kept at work in at least two eight-hour shifts, if not in three.

Serious Traffic Situation in Seattle

Chairman of Emergency Fleet Corporation Appeals to State Council of
Defense to Bring All Agencies Together

W. R. Crawford, attorney for Seattle jitney men, appeared before the State Public Service Commission in session in Seattle, Wash., recently, and stated that if the Puget Sound Traction, Light & Power Company would drop its federal court suit, and allow the jitneys to operate, the transportation situation in the city of Seattle would be practically cleared up.

Dr. Henry Suzzallo, chairman of the State Council of Defense, stated at the hearing that he was in receipt of a telegram from Chairman E. M. Hurley of the Emergency Fleet Corporation, asking the Council to take hold of the transportation situation in Seattle. Dr. Suzzallo said:

"I shall probably go ahead at once, and hope to have a series of conferences with the different agencies involved, namely, the steam railroads, the traction company, the ferries of the Port Commission, and the shipyards. It is my plan at the outset to consult with individuals, and get a thorough understanding of the situation from men who know all about it, before calling organizations to the Council table."

The Puget Sound Traction, Light & Power Company, through A. L. Kempster, general manager, has expressed a desire for steam road transportation aid, and a willingness on the part of

the company to go into conference to improve the situation.

Mr. Kempster said:

"We shall be more than glad to meet the city authorities, the heads of the shipbuilding plants, the Seattle commercial bodies, steam railroad officials, the Port Commission and federal representatives in a conference or a series of conferences. The shipyard situation has grown up so rapidly that the transportation system is taxed to the limit.

"The matter of revenue has no weight with us. The sole question is one of transportation. It has been suggested that the railroads have no legal right to enter into local passenger traffic. Our answer is that as the only corporation affected, we will enter no objections on legal grounds to anything the railroads do in this respect. The steam lines very likely would make no money on such traffic at a 5-cent fare, but that is not material. They are under federal control, and the revenues guaranteed."

A. L. Valentine, superintendent of public utilities of Seattle, in an effort to help to solve the transportation problem in the city, wired to Chairman Hurley of the Emergency Fleet Corporation, urging him to assist in obtaining the steam tracks for use.

Increase in Fare in Effect in Pittsburgh

Beset by Operating and Financial Problems Pittsburgh Railways Saw This the Only Way Out

Like most of the other electric lines operating in industrial centers the Pittsburgh (Pa.) Railways has been called upon since the beginning of the war to meet extraordinary demands for service. These demands were severe enough before the entrance of the United States into the fight for liberty, but they have become more burdensome since that time. Owing to the topography of the city there were natural problems enough to meet in normal times. With the strain that has been added within the last few months and with the coming of winter interruptions to service that ordinarily would pass with only scant notice have taken on for many riders what appears as a serious aspect. The result has been that the company has been charged of late with everything from indifference to the needs of the community to gross incompetence.

The Public Service Commission has projected itself into the situation, and has under way a series of public hearings looking toward a measure of relief. As a preliminary move the commission has already ordered the re-routing of certain lines in the downtown district, has changed some of the stops previously in use, has ordered a consolidation of the freight depots of the suburban lines on the Monongahela wharf and has set forth a standard for heating and cleaning the cars. The company has given public notice that it will endeavor in every way possible to co-operate with the city to improve service in compliance with the recommendations of the commission.

The situation for the company has been made more difficult by the need which arose for not meeting the interest on the bonds of some of the underlying companies. The rumor-mongers at once got busy and many dire things were predicted. It finally became necessary for J. H. Reed, vice-president of the company, to make a flat denial that there was any intention to apply for a receiver for the company in the immediate future.

The company is in need of more revenue. No secret has been made of this fact for some time past. It is now going after this in the direct way followed by other companies throughout the United States beset by the same need. A new tariff was filed with the Public Service Commission in December calling for 5½-cent and 6-cent charges for day traffic. This new tariff was to go into effect on Jan. 22.

The city was quick to jump into the increased-fare fray. After an executive session of the City Council, Assistant City Solicitor C. K. Robinson made a statement in which he said that the city would resist vigorously any attempt on the part of the company to increase its fares.

In a statement which it made the company said in part:

"The respondent denies that the pro-

posed rates, prices and changes as set forth in the tariff and schedule filed on Dec. 22, 1917, to become effective Jan. 22, 1918, are unjust, unreasonable and excessive, and discriminatory, in violation of the public service commission law. Such rates and fares are fair, just and reasonable, and an increase in fares is absolutely necessary at this time unless the service of the respondent is to suffer serious loss and deterioration, as respondent is unable to compete against the high prices of all material and labor without increasing its price on its own product, which is electric railway service.

"A passenger of the company can ride for 5½ cents if he purchases ten tickets, but not otherwise. It is a customary and reasonable way to sell tickets in quantities at a reduced price.

"The respondent denies that the proposal that the night fares shall be 10 cents and that the transfer privileges shall be suspended at that time, are unjust and unreasonable.

"It does not believe that the proposed increase in fares will furnish it with enough money to secure all the labor necessary to operate its system as it

was operated in times of peace, but it knows no other way in which to meet the situation except to increase its revenues so that it may have additional funds with which to purchase labor and material and supplies for the operation of its railway. None of the money secured from this increased fare will be used to pay dividends on the stock of the respondent, but will be used to pay the necessary expenses of operating the electric railway lines included in the system of the company."

INJUNCTION REFUSED

Judge John D. Shafer, in Common Pleas Court, on Jan. 21 refused to grant the temporary injunction sought by the city of McKeesport and five boroughs through which the company operates to prevent the Pittsburgh Railways from putting the proposed fare increase into effect. Judge Shafer said that the matter of the change in rates was one for the Public Service Commission to decide.

Under the new tariff the cash fare is 6 cents, but two tickets are sold for 11 cents, or ten tickets for 55 cents. In order to facilitate the making of change when cash fare is tendered the company is offering a 4-cent paper change slip in place of 4 cents. These slips it redeems with cash at par or accepts as part payment for another fare.

Commission Makes Suggestions

Offers Advice to the Boston Elevated on How to Meet Some of the Problems Before It

The Public Service Commission of Massachusetts, through Chairman Frederick J. Macleod, has offered certain suggestions to the Boston Elevated Railway for improving its service. The commission says that it recognizes the difficulties under which the company is operating at present, and that the suggestions are made with the hope that they may prove helpful to the company. Among other things the commission suggests the following:

SOME OF THE SUGGESTIONS

"That the terms of employment during the period of instruction be made more liberal.

"That the assistance of State and federal employment bureaus be freely sought.

"That the company accept as employees men subject to the draft but not likely to be called for some months.

"That posters be placed in cars and stations stating an imperative need for additional help of various kinds.

"That the union be urged to co-operate in securing additional men.

"That consideration be given to the employment of young men more than eighteen years of age attending schools and colleges.

"That the company's employees be urged to help out, so far as possible, by overtime.

"That patrons, particularly shoppers, be urged to avoid rush hours.

"That theaters and other places of entertainment be induced to close at 4 o'clock.

"That eight-car trains be run morning and evening in the tunnel from Forest Hills to Sullivan Square."

Fare of 2.5 Cents Allowed

The Indianapolis & Cincinnati Traction Company, in an order issued by the Public Service Commission of Indiana on Jan. 19, has received authority to increase its passenger rates to a basis of 2.5 cents a mile. The action is to be understood as a war emergency measure, and the order may be revoked at the pleasure of the commission and the former rates re-established. The company must report quarterly. The increase was to go into effect on Jan. 23.

A summary of the findings of the commission in the petition of the company shows that there will be a reduction of 5 per cent for round trip tickets; the issuance of the C.E.T.A. commutation books, containing 2000 1-cent coupons, which shall sell for \$17.50, and the coupons shall be accepted at face value for passenger fares.

At the same time, the commission authorized the Union Traction Company of Indiana to charge a minimum fare of 10 cents on its interurban lines, outside of cities and towns, in place of the former minimum fare of 5 cents. This particular phase of the petition of the Union Traction Company had been previously denied when the recent order of the commission was made granting increases in certain interurban and city passenger rates.

Commission to Study Kansas City Situation

Power, Traffic, Coal, Labor and Revenue Matters All Receive Attention at Hearing Before State Commission

The Public Service Commission of Missouri, following a hearing in Kansas City on Jan. 10 to 12 on complaint of inadequate service by the Kansas City Railways, included in its order to the company this feature:

"In order that the commission may know that the service is installed as promptly as possible, it will be ordered by the commission that Commissioner Flad, with the aid of employees of the commission, shall come to Kansas City and personally observe and see that the defendant company takes all possible steps to secure the necessary labor, power and fuel to install and operate this schedule, and to assist the company in securing the same."

SIX-CENT FARE APPEAL LIKELY

The company, during the hearing, introduced evidence that it could not afford to improve service without an increase in fare. The commission declared that, under the franchise, the duty of giving adequate service was paramount, and the question of revenues could not be taken up at the hearing. The company will soon, it is said, ask that a 6-cent fare be allowed.

The commission's investigator reported that the Kansas City Light & Power Company, which buys energy from the Kansas City Railways, was not supplying any current for street railway operation on the peak loads. He reported that the power company could render help at the times of maximum loads of the railway sufficient to give exactly the total amount of current needed for operating full schedules. In its preliminary order the commission did not touch on this point.

The commission's appearance in the question of service followed a long period of attacks on the company. The evidence that the company introduced showed that it had been hampered since last summer by labor troubles, rising prices, inadequate revenues, coal shortage, and inability to secure needed equipment. A few days before the hearing the Council adopted an ordinance calling on the company to re-establish the schedule adopted by it last July. The commission sent investigators who prepared reports on the schedules maintained showing naturally that last summer's service was not now being given.

Into this situation the hearing of the commission injected several favorable elements. Col. Philip J. Kealy, who had for several months been with his regiment, had returned a few days before, and he was examined by Clyde Taylor, vice-president and counsel of the company, who acted as president during Colonel Kealy's absence. Colonel Kealy was able to get into the record statements of the situation that seemed to make an impression. On the fuel question, he pointed out that the company had contracted for coal from Illinois, the base price being gaged by

the labor costs, f. o. b. mines—labor and freight both having risen. He added that the Illinois coal did not have the B.t.u. values of the Kansas Cherokee coal—but that coal could not be bought on the B.t.u. basis in the Kansas City district, the company having, indeed, to subsidize two mines recently to get them into operation for adding to its coal resources. The increased cost of fuel to the company this year was \$500,000. Many other increases in costs were mentioned. Colonel Kealy pointed out that the company had tried earnestly to reduce expenses to meet each increased cost. He mentioned as an instance of improvisation the manufacture of trolley poles in the company's shops, because of the many months of delay in securing delivery from companies making them.

WAGES INCREASED \$361,000 A YEAR

Colonel Kealy said that the direct increase in operating expense due to higher wages was \$361,000 a year. Labor costs for work other than platform service also were responsible for increases other than those that appeared in the records under different headings. In this connection he referred specifically to costs for track work.

Colonel Kealy made it clear to the commission that the problem of getting labor, and keeping it at work, was a very real one. After mentioning the many ways in which trainmen's tasks had been lightened, he added that there were ten times as many complaints from trainmen as formerly; that many who were financially able to do so took the same course as coal miners and worked only when they felt like it. The day Colonel Kealy testified the temperature was 15 deg. below zero, and ninety-four runs were without men that morning, because the men had not showed up for work.

WOMEN EMPLOYEES CONSIDERED

The company has been arranging to put women on trailers, as collectors, and this matter was gone into by the commission. E. F. Michael, president of the local trainmen's union, had declared that there were plenty of men willing to work for the company, and that it was unnecessary for it to employ women. He said that if the company did hire women, he would advise the men to quit work; that if the commission's investigators found it was necessary for the company to employ women and so recommended, and if the war department of the federal government found that the company should employ women on cars, he still would advise the men to quit work in case the women were actually employed.

Colonel Kealy said:

"Unless the company has credit it cannot borrow, and if it does not earn, it cannot spend."

Colonel Kealy went into the present

financial situation of public utilities. He said that in a growing community like Kansas City the yearly expenditures for capital account must continue, as a community could no more stand still than could an individual.

Toward the end of the session Mr. Taylor suggested to the commission that it appoint a representative to observe the operation of the system and aid the company in overcoming the obstacles. The commission did so.

The result apparently puts the matter of service, and all other matters that have been harassing the company, into the hands of the commission, removing them from the immediate control of the City Council.

Interurban Station for Kansas City

\$1,750,000 Involved in Plan to Establish Terminal at Tenth and McGee Streets

An ordinance locating a union interurban station at Tenth and McGee Streets, Kansas City, Mo., and granting a franchise to the Interurban Station Company, which will erect and manage the station, on Jan. 7 was passed by the City Council of Kansas City over the Mayor's veto. The ordinance had been pending in the Council for nearly three years.

C. C. Peters, secretary of the Emery-Bird-Thayer Dry Goods Company, is president of the Interurban Station Company. Dr. W. E. Minor is treasurer and Scaritt, Jones & Miller are counsel. Other directors are R. A. Long, C. A. Braley and W. C. Scarritt. It is proposed to issue \$250,000 of preferred stock and \$900,000 of bonds. These amounts, with \$600,000 already pledged, will bring the total up to \$1,750,000, the amount that the project is expected to involve.

The terminal will occupy a block between Ninth and Tenth Streets, extending through from McGee Street to Oak Street. The tracks will occupy the north half, and a six-story office building, with two-story lobby, will fill the other half. The lobby will be 65 ft. x 200 ft.

Decision in Milwaukee Coupon Case

Judge E. Ray Stevens of the Dane County (Wis.) Circuit Court decided on Jan. 22 that the order of the Railroad Commission of Wisconsin of Aug. 23, 1912, requiring the Milwaukee Electric Railway & Light Company to sell thirteen tickets for 50 cents was unreasonable. The order was rescinded by the commission in 1915, and the matter under litigation involved the validity of coupons issued with tickets during the time the order was in effect. The face value of these coupons originally issued amounts to \$193,000. Officials of the Milwaukee Electric Railway & Light Company are unable to state whether or not the commission will appeal to the Supreme Court.

Freight Advance Allowed

Indiana Public Service Commission Passes Favorably on Appeal of Interurban Railways

The Public Service Commission of Indiana has granted the petition of the interurban railways to be permitted to increase intrastate freight rates to a point commensurate with the new rate basis of the steam railroads recently authorized by the commission. Hearings were held before the Public Service Commission on Jan. 4 and 5. The electric railways stated that the hauling of freight on their cars was a more expensive proceeding than on the steam railroads, because of varying conditions.

The average increase in freight rates granted by the order of the commission will be 20 per cent. In many instances the rates will be increased, but in some cases they will be decreased. Uniformity of existing rates and the abolishing of certain rate discriminations are also covered in the action of the commission, as was the case with the steam roads. The freight tariffs in effect on the interurban roads were, in general, the same as those which had been in effect on the steam roads prior to the increase granted them by the commission. The commission, in its findings, makes several references to the advantages of shipment by the interurban electric railways as compared with the steam railroads.

Transportation News Notes

Chicago "L" Traffic Increases.—For the six months ended Dec. 31, 1917, the Chicago elevated railroads transported 95,906,970 passengers as compared with 93,167,170 for the corresponding period of 1916, or an increase of 4.1 per cent.

Appeals Fare Increase Order.—Commissioners of Cuyahoga County, Ohio, have appealed to the Supreme Court an order of the Public Utilities Commission, allowing the Cleveland & Eastern Traction Company an increase of rates.

Rate Increase Suspended Until June.—The Public Utilities Commission of Illinois has suspended until June 1, 1918, a proposed increase in rates by the Central Illinois Public Service Company operating 15 miles of electric railway between Anna and Jonesboro.

Skip-Stop Plan Adopted at Dayton.—The City Commission at Dayton, Ohio, has adopted an ordinance providing for the elimination of a number of stops on each line and allowing cars to run at greater speed. The measure was viewed in the light of fuel conservation.

Commutation Books for Rockford.—The Rockford & Interurban Railway, Rockford, Ill., which has been author-

ized by the Public Utilities Commission of Illinois to raise its passenger fares to 2 cents a mile, will place on sale commutation books in the denominations of \$2.50, \$5 and \$10.

Ohio Electric Seeks Higher Rates.—The Ohio Electric Railway, Cincinnati, Ohio, has filed a new schedule of rates with the Public Utilities Commission. It provides for an increase to 2 cents a mile between certain points and 2½ cents between other points. Feb. 1 is the date set for the new rates to go into effect.

Owl Service Not Needed.—The experiment of two months with owl car operation on an hourly schedule all night on the West Fourth Street and Delaware Avenue lines of the Wilmington & Philadelphia Traction Company in Wilmington, Del., has convinced the company that there is no real need for the service and it will be discontinued.

Freight Rate Increase Allowed.—The Public Service Commission of Oregon has issued an order granting the Portland Railway, Light & Power Company a 15 per cent increase in its freight rates, with the exception of wood. Tariffs asking for the increase were filed in October, but they were suspended pending an investigation by the commission.

Freight Hearing Postponed.—The Railroad Commission of Texas has postponed to Feb. 13 the hearing which was ordered to be held at Austin relative to charges that have been made before the commission alleging that the interurban electric railways of Texas are now engaged in a freight carrying business. The hearing was ordered following a recent increase in express rates by the interurban lines.

State Against City in Utah.—The attorney-general of Utah has announced that he will contest the application made by Salt Lake City to the Supreme Court for a ruling on an order of the Public Utilities Commission of Utah suspending the sale of fifty commutation tickets for \$2. The attorney-general contends that the State law gives the Public Utilities Commission the right to set aside the provisions of a franchise.

Women in Training in Kansas City.—The Kansas City (Mo.) Railways has received uniforms ordered for women conductors and is training about twenty women for such jobs. It is understood, however, that at least for the present the government representatives who are looking after labor problems are not encouraging the employment of women. The Public Service Commission of the State is also said to be opposed at present to the employment of women. The applicants for positions will be trained, however, so that if a serious emergency arises they may be ready to go to work.

Women Proposed for Little Rock.—In the course of an interview in which he reviewed the strain under which the railway department of the company had been placed on account of the location of a cantonment near Little Rock, the taking of men for war work and in-

creased activity generally, C. J. Griffith, general manager of the Little Rock Railway & Electric Company said: "I have decided the only way out is to get women. I have planned to employ about forty young women and begin educating them as conductors. I believe they will make it possible for us to give better service anyway."

Some of Mr. Witt's Suggestions Adopted.—Acting upon the suggestions of Peter Witt, Cleveland, who reported recently to the City Commission of Trenton, N. J., the Trenton & Mercer County Traction Corporation will make a number of changes to its routes through Trenton and build new lines on certain streets and discontinue service on other thoroughfares. The Olden Avenue branch will be discontinued, a line will be built through Bridge Street to the Municipal dock, the line of South Clinton Avenue, from Hamilton to Stanton Street, will be torn up and a new line built on Washington Street to Cedar Lane, a portion of the Market Street division abandoned, the line to Trenton Junction, a distance of 3 miles, abandoned, and loops built at the Clinton Street station and at Cadwalader Park.

Another Dallas Jitney Ordinance.—Jitneys in Dallas, Tex., appear to be doomed. Although the Court of Civil Appeals recently decided two cases adversely to the jitneys, they have continued to operate pending appeal to the State Supreme Court in these two cases. The City Commission, however, spurred to action by several serious accidents by jitneys in which one person was killed and several others seriously injured, declared an emergency and enacted an ordinance directed primarily against the jitneys, yet it is all-inclusive and affects private cars as well as jitneys. The ordinance is very stringent in its regulations. It limits the carrying capacity of autos to the seating capacity. The jitney men claim they cannot operate and pay expenses if limited to four passengers per trip, unless they charge a 10-cent fare, and that if they do this they will not be able to compete with the electric railroads.

Government Control Does Not Affect Rate Cases.—In reply to an inquiry as to whether the Railroad Commission of California would hear on Jan. 24, as scheduled, the applications of the Southern Pacific Company and the San Francisco-Oakland Terminal Railways for authority to raise their ferry and suburban passenger rates at San Francisco, the commission replied in the affirmative. The commission said: "This inquiry is apparently prompted by President Wilson's proclamation of Dec. 26. We have given careful consideration to this proclamation and find nothing therein or in any order issued by the federal government which persuades us that any course other than that originally mapped out should be pursued. Unless developments should make another course necessary, the adjourned hearings in these proceedings will be held on Jan. 24."

Personal Mention

W. H. McAloney, superintendent of rolling stock of the Denver (Col.) Tramway since 1902, has resigned, effective on Feb. 1.

J. Hulme has been appointed superintendent of equipment of the International Railway, Buffalo, N. Y., to succeed **George Kuhns**, transferred.

Guy E. Tripp, whose appointment to the ordnance department of the U. S. Army was noted in the *ELECTRIC RAILWAY JOURNAL* for Jan. 19, has received a commission as colonel.

George Kuhns, superintendent of equipment of the International Railway, Buffalo, N. Y., has been transferred to the position of master mechanic, a place formerly held by him.

Emory L. Coblentz, president of the Hagerstown & Frederick Railway, Frederick, Md., has also been elected president of the Chambersburg, Greencastle & Waynesboro Street Railway, Waynesboro, Pa.

Edward Schlant, assistant superintendent of the city lines of the International Railway, Buffalo, N. Y., has been appointed acting city superintendent to succeed **T. W. Connette**, now in government service.

Allen G. Hoyt, New York, N. Y., has been elected chairman of the executive committee of the Kansas City, Clay County & St. Joseph Railway, Kansas City, Mo., and a director of the company to succeed **Thomas A. Reynolds**, resigned.

W. C. Davidson, treasurer of the Spokane & Inland Empire Railroad, the United Railways, the Oregon Electric Railway, Portland, Ore., and affiliated lines, will hereafter act as tax agent and all tax matters of the companies will be under his jurisdiction.

J. P. Morton, formerly with the Northern Texas Traction Company, Dallas, Tex., will serve as superintendent of transportation of the Eastern Texas Electric Company, Beaumont, Tex., succeeding to part of the duties performed previously by **W. V. Neal**, resigned.

E. J. Davis, local purchasing and claim agent of the Eastern Texas Electric Company, Beaumont, Tex., will hereafter have general supervision over the city and the interurban lines of the company, succeeding to part of the duties heretofore performed by **W. V. Neal**, resigned.

W. V. Neal has resigned as superintendent of the Beaumont (Tex.) Traction Company and the Jefferson County Traction Company, included in the system of the Eastern Texas Electric Company, controlled by **Stone & Webster**, Boston, Mass., to accept service on one of the firm's other properties. Mr. Neal has been at Beaumont four years. He has served with **Stone &**

Webster since 1902, with the exception of the time he spent in Europe, China and Japan.

Thomas W. Connette, superintendent of the city lines of the International Railway, Buffalo, N. Y., and son of **E. G. Connette**, president of the company, has been granted a leave of absence and has gone to Washington, where he has received a commission as first lieutenant in the Ordnance Reserve Corps.

J. C. Daries, right-of-way and tax agent of the Spokane & Inland Empire Railroad, the United Railways, the Oregon Electric Railway, Portland, Ore., and affiliated lines, will be relieved of his duties as tax agent but will perform, in addition to his duties as right-of-way agent, the duties of sales manager of the Ruth Realty Company.

H. A. Cowgill, formerly engineer of maintenance of way of the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., has been appointed general superintendent of the Mansfield Electric Light & Power Company, Mansfield, Ohio, and will assume charge of the electric railways of the company. Both properties are controlled by **Henry L. Doherty & Company**.

Alexander Lightstone, supervisor of the United Railways, St. Louis, Mo., has gone on the inactive list of the company through a nervous breakdown. Mr. Lightstone was born in St. Louis. His first work for the company was as a "hill" boy. After some years of service he left the company and was out of railway work for several years. He became a conductor on the Page line in 1892 and was promoted to supervisor in 1900.

A. C. Woehler, master mechanic of the El Paso (Tex.) Electric Railway for the last eleven years, has resigned to go into the automobile business for himself. Mr. Woehler has been with **Stone & Webster**, who control the El Paso property, for more than twenty-four years. He started as a boy in the shops at Houston, and was an engineer at the power house there for some years until he was promoted and sent to El Paso as master mechanic. The employees at the carhouse of the El Paso Electric Company presented Mr. Woehler with a gold watch, chain and charm as a token of their appreciation.

Edward J. Neary, electrical engineer with the Public Service Commission for the First District of New York, engaged on rate and capitalization cases, has been granted a leave of absence to accept an appointment as an electrical officer on board the *U. S. S. Utah* with a commission as lieutenant. Mr. Neary was graduated from Pennsylvania State College and has been in the electrical field for the last ten years. Since he

was graduated he has been with the American Gas & Electric Company, the University of Pennsylvania, **Henry L. Doherty & Company** and the Public Service Commission for the First District of New York.

William Howard Davis has been advanced to the rank of supervisor of the United Railways, St. Louis, Mo., in place of **Alexander Lightstone**, who has gone on the inactive list through a nervous breakdown. Mr. Davis was born in St. Louis forty-four years ago. He went to work for the old Missouri Railway in 1888. When the lines in St. Louis were equipped with electricity Mr. Davis was taken into the Thomson-Houston shops. In 1893 Governor (now Senator) **Stone** put Mr. Davis on the police force, where he remained until 1905, being promoted in the Mounted District. Preferring electric railway work, he returned to the front platform, and for the last twelve years has been in the third division.

John J. Dempsey, who was elected vice-president of the Brooklyn (N. Y.) Rapid Transit Company on Dec. 27, was the guest of honor at a dinner given to him by a number of his friends on Jan. 18 at **Delmonico's**, New York. About seventy were present and Mr. Dempsey received many congratulations on his elevation to his present office, which completed a number of promotions, beginning with that of advancement from telegraph operator to assistant dispatcher. **Joseph K. Choate** acted as toastmaster. The first speaker was **Colonel Williams**, president of the Brooklyn Rapid Transit Company. He referred to Mr. Dempsey as being a "constant cheer, constant inspiration, constant reliance." Others who spoke included **H. H. Vreeland**, **B. A. Hege-man, Jr.**, **E. A. Maher, Jr.**, **H. C. Don-ecker**, **Dr. E. A. Brennan**, **LeRoy T. Harkness**, attorney for the Public Service Commission, and **W. O. Wood**.

Obituary

William Earle died recently in St. John, N. B. He was at one time manager of the St. John Street Railway, although latterly he was engaged in engineering work for the Dominion government and the Canadian Pacific Railway.

B. Frank Hires, formerly general manager of the Bridgeton & Millville Electric Company and the Millville, (N. J.) Traction Company, died at his home, Bridgeton, N. J., recently. Mr. Hires was connected with the company for eighteen years.

F. L. Brown, one of the pioneer merchants of Portland, Ore., and for many years secretary of the Portland Traction Company, now included in the system of the Portland Railway, Light & Power Company, is dead. The Portland Traction Company was a Cali-

fornia corporation and during his service of ten years as secretary of the company Mr. Brown made his home in California. He also represented the Washburn & Moen Manufacturing Company and the American Steel & Wire Company in San Francisco.

Lieut. Gordon D. Cooke, formerly with the McGraw-Hill Publishing Company, Inc., publisher of the *ELECTRIC RAILWAY JOURNAL*, died at the base hospital at Fort Bliss on Jan. 10 from pneumonia. Lieut. Cooke was graduated from the University of Michigan in 1916. As a preliminary training for his work in the field service department of the McGraw-Hill Company he served on the editorial staff of the *Engineering News-Record* for a short period and later took up quarters at his home city, Detroit, Mich. On Sept. 1, 1917, Lieut. Cooke entered the service of the United States at the age of twenty-four, with the commission of second lieutenant in the Engineer Corps. He was temporarily stationed 75 miles from a railroad in New Mexico doing military mapping for the United States Geological Survey.

W. F. Carr, engineer of the Chicago, South Bend & Northern Indiana Railway, South Bend, Ind., was instantly killed on Saturday night, Jan. 12, while operating a snowplow on the lines of the Southern Michigan Railway. During the blizzard on Saturday a car containing about fifteen people was snowbound between Niles, Mich., and South Bend, Ind., and Mr. Carr and a crew of men volunteered to rescue these passengers. This they succeeded in doing, after the car had been snowbound for about nine hours. The car was pulled back to a siding and allowed to proceed to South Bend, after which Mr. Carr and his crew returned to the point where the car was stalled to remove the obstruction. A large bank of snow and ice had evidently formed back of the stalled car, so that the snowplow in striking it was thrown from the track and upset. Mr. Carr in falling seemingly struck some part of the car or machinery on his head and shoulders, as the indications were that his neck was broken. The other members of the crew escaped unhurt. Mr. Carr had been in the employ of the company only a few months, but during this time all his associates had learned to admire and love him. He was a man of fine character and exceptional ability as a maintenance engineer. He was always considerate of the welfare of others, as is shown by his willingness at this time to risk his own life for their comfort. Previous to his last connection Mr. Carr was for seven and a half years engineer of maintenance of way of the Chicago, Ottawa & Peoria Railway at Ottawa, Ill., which is a part of the Illinois Traction System. As engineer of the Chicago, South Bend & Northern Indiana Railway he had supervision of all roadway, track, bridges and buildings, and also acted as consulting engineer for all departments. A biography and a portrait of Mr. Carr were published in the *ELECTRIC RAILWAY JOURNAL* for Nov. 10, 1917, page 883.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Recent Incorporation

***Montgomery Transit & Light Company, Norristown, Pa.**—Incorporated under the laws of the State of Delaware to construct and operate railways and light plants. Capital stock, \$1,000,000. It is understood that the new company is organized to take over the Montgomery Transit Company which operates a line from Norristown to Harleysville, 13 miles.

Franchises

Los Angeles, Cal.—The Railroad Commission of California has authorized the Pacific Electric Railway to construct a track across East Ninth Street, East Eighth Street and a part of Long Beach Avenue. The company was also authorized to build a turnout in Sixteenth Street between Arlington Street and Second Avenue and a track in Lake Shore Avenue and across Montana Street, Berkeley Avenue and Alvarado Street.

Venice, Cal.—An ordinance will be prepared by the City Trustees of Venice offering for sale the franchise to operate cars along the Ocean Front in Venice.

Track and Roadway

Muscle Shoals Traction Company, Florence, Ala.—It is reported that Frank L. Davies, Danville, Ill., has become interested in the plan to construct an electric railway from Huntsville to Florence, about 64 miles, and will undertake its promotion. [Aug. 11, '17.]

Clear Lake Suspended Monorail Company, Hopland, Cal.—It is reported that the Clear Lake Suspended Monorail Company has awarded a contract to G. L. Hardison, San Francisco, for grading, bridging, track-laying, buildings, fencing and installing equipment on its proposed line from Hopland to Lakeport at \$532,000. [Dec. 1, '17.]

Municipal Railway, San Francisco, Cal.—Bids will be received by the Board of Public Works until Jan. 10 for the double-tracking of Market Street, from Van Ness Avenue to Third Street. It is estimated that the cost will be about \$120,000.

Miami, Fla.—Bids are being asked by the commissioners of Dade County for the construction of two steel bascule bridges in Miami Causeway, one on the east and one on the west side of Biscayne Bay. Each bridge will be 140 ft. long and consist of double-leaf bascule span providing a 60-ft. clear waterway and steel approach span on each end. The bridge will provide for roadways 20 ft. wide, sidewalk 5 ft. wide and electric railway track outside of roadway. Klyce & Kackley, Townley Building, Miami, engineers.

Indianapolis Traction & Terminal Company, Indianapolis, Ind.—The Board of Public Works of Indianapolis has rescinded an order requiring the Indianapolis Traction & Terminal Company to build and maintain a crosstown line from Virginia Avenue across South Street to Kentucky Avenue to the Union Stock Yards.

Southwest Missouri Railroad, Webb City, Mo.—It is reported that the Southwest Missouri Railroad has taken over the Oklahoma, Kansas & Missouri Railroad, which operates 14 miles of road; and will electrify the line. Work on the company's line into Baxter Springs, Kan., is being rushed, while the grading of the line from Baxter to the connection with the Oklahoma, Kansas & Missouri Railroad is being hurried along. It is expected that by May 1 cars will be making hourly trips between Miami, Okla., and Carthage, Mo.

Butte (Mont.) Electric Railway.—City Attorney George Toole has been asked to decide whether it will be legal for the Butte Electric Railway to double-track its line on Main Street, from Quartz to Park Street. A petition to lay double-track was presented to the City Council recently by the company, with the object in view of better service between Butte and Walkerville and Butte and Centerville.

Manchester Traction, Light & Power Company, Manchester, N. H.—This company has purchased the water rights connected with the United States Bobbin & Shuttle Company, giving the company all the water privileges that are desirable from the mouth of the river in Manchester, where it empties into the Merrimac River and the village of Goffstown.

New York Municipal Railway Corporation, Brooklyn, N. Y.—A contract has been awarded by the New York Municipal Railway Corporation to the Federal Signal Company, Albany, for the installation of an a.c. electric interlocking plant with a.c. track circuits at the Jamaica terminal of its elevated system.

Manila Electric Railroad & Light Corporation, Manila, P. I.—Extensive improvements are being contemplated by the Manila Electric Railroad &

Light Corporation during the next five years, including the construction of new tracks, new track terminals, reconstruction of old tracks and the reconstruction of the overhead system.

Chattanooga (Tenn.) Traction Company.—A contract has been accepted by the Chattanooga Traction Company to operate cars over the new bridge at Chattanooga for five years.

Dallas (Tex.) Railway.—Two hundred and fifty tons of rails to be used in the improvements and extensions of the Dallas Railway Company's tracks in the city of Dallas have been shipped from Lorain, Ohio, on Jan. 2. The shipment is expected to arrive in Dallas by Feb. 1, according to Richard Meriwether, general superintendent and general manager. The total of 1200 tons of rails was ordered, but the mills at Lorain could not fill the entire order at one time. The rails now en route to Dallas will be used in double-tracking the Colonial Avenue line, and work will begin as soon as the rails arrive.

El Paso (Tex.) Electric Railway.—This company will double-track its line between Cotton Avenue and Piedras Street, putting in one switch between the El Paso and Southwestern crossing and Cotton Avenue and two more between the El Paso & Southwestern rails and Piedras Street at a cost of \$25,000.

***Houston, Tex.**—It is reported that the City Council of Houston has prepared specifications for the construction of a municipal belt line in Houston. E. E. Sands, city engineer.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—In order to obtain better transportation facilities for the thousands of workmen in the shipyards and other industrial plants in the Harbor Island District of Seattle, the West Side Commercial Club of West Seattle is starting a campaign to secure increased street car service. One of the first moves will be to endeavor to induce the Puget Sound Traction, Light & Power Company to build a line from the present Alki line over Avalon Way to relieve some of the congestion on the single-track Fauntleroy line through Youngstown. An experiment with a jitney bus is being tried on the Alki Avenue line, and in the event that other means to solve the transportation problem fail, it is possible that jitneys may be installed on the other lines to supplement the street car service.

Seattle (Wash.) Municipal Railway.—Before Feb. 1 cars will be operated by the Seattle Municipal Railway, from Third Avenue and Pine Street across the Salmon Bay bridge at Fifteenth Avenue N. W. to the north city limits at Thirty-second Avenue N. W. and West Eighty-fifth Street, a distance of about 6 miles. Operation from Twenty-third Avenue N. W. and West Sixty-seventh Street will be over the old Loyal Heights line, which will form a link with the downtown line known as Division A. The Central Labor Council plans a celebration on the occasion of the opening of the city car line.

Shops and Buildings

Georgia Railway & Power Company, Atlanta, Ga.—An interurban passenger station will be built by the Georgia Railway & Power Company at Camp Gordon.

Chicago, Milwaukee & St. Paul Railway, Chicago, Ill.—The construction of freight house at Roundup, Mont., is being contemplated by the Chicago, Milwaukee & St. Paul Railway next spring, to cost approximately \$40,000.

Galesburg Railway, Lighting & Power Company, Galesburg, Ill.—Stables owned by the Galesburg Railway, Lighting & Power Company at Galesburg were recently destroyed by fire. The loss is estimated at about \$6,000.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Trenton & Mercer County Traction Corporation is having its carhouse, recently damaged by fire, rebuilt. Repair parts for the cars that were burned are slow in arriving owing to transportation conditions.

Lawton Railway & Lighting Company, Lawton, Okla.—A new carhouse is being built by the Lawton Railway & Lighting Company on North Second Street.

Texas Electric Railway, Dallas, Tex.—It is reported that the Texas Electric Railway will construct a passenger station and repair shop at Denison.

Power Houses and Substations

Fort Smith Light & Traction Company, Fort Smith, Ark.—A contract has been awarded the Fort Smith Light & Traction Company for furnishing an ornamental lighting system on Garrison Avenue for a period of ten years.

Arkansas Valley Railway, Light & Power Company, Pueblo, Col.—Work has been begun by the Arkansas Valley Railway, Light & Power Company on the construction of a transmission line to serve Penrose.

Shore Line Electric Railway, Norwich, Conn.—A new power house will be built by the Shore Line Electric Railway in Thamesville. Orders have been placed for two 10,000-kw. turbines. The contract calls for the delivery of one turbine in May and the other in June, and it is expected that the plant will be in operation by Oct. 1.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Trenton & Mercer County Traction Corporation is erecting foundations at its Lincoln Avenue powerhouse for the installation of a new 2000-hp. engine and generator.

Manila Electric Railroad & Light Corporation, Manila, P. I.—Among the improvements contemplated by the Manila Electric Railroad & Light Corporation is the installation of a new 5000-

kw. turbo-generator and other special power plant equipment which will increase the electric generating capacity of the plant about 50 per cent, or from approximately 10,000 kw. to approximately 15,000 kw.

Montreal (Que.) Tramways.—A new 1500-kw. motor-generator set has been installed by the Montreal Tramways in its William Street power house. This is the last of four units ordered from the Canadian General Electric Company. One of these units has been installed at the St. Henry substation and two others at the St. Denis substation.

Dallas (Tex.) Railway.—The contract providing for the exchange of power between the Dallas Power & Light Company and the Texas Power & Light Company, has been approved by the City Commission. The contract as originally submitted to the supervisor of Utilities called for an expenditure of \$350,000 for transmission lines and transforming apparatus, but concessions have been made which will save the local company a total of \$130,000. The contract covers the purchase of 3000 kw. with an increase to 5000 kw. Under the agreement the Dallas company will furnish energy to the Dallas Railway Company for the Oak Cliff and East Dallas lines, which is now supplied by the Northern Texas Traction Company.

Virginia Railway & Power Company, Richmond, Va.—This company will construct an electric transmission system from Petersburg to Suffolk.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—The Puget Sound Traction, Light & Power Company, has under way additions to its White River or Lake Tapps hydro-electric generating station and its Georgetown steam plant that will permit of a total increase of 36,400 additional horsepower with which to serve the industrial needs of Tacoma and Seattle. Last April construction was begun on the installation of a 23,000 hp. generating unit at White River in addition to the two generators already in operation there, each of which has a capacity of 20,000 hp. This new unit will be in operation by March 1, next, giving the White River plant a total capacity of 63,000 hp. at that time. In addition to this a 13,000 hp. generator will be installed at the Georgetown steam plant and this additional capacity will be in operation by summer. When this development is completed the company's hydro-electric plants supplying Tacoma and Seattle with power for industrial needs will have a combined capacity of 107,997 hp.

Appalachian Power Company, Bluefield, W. Va.—Details have been decided upon by the Appalachian Power Company for its proposed steam-driven electric generating plant at Glen Lyn, Va. The building will be 150 ft. x 150 ft., of concrete, brick and tile, with provision for an extension to provide an ultimate capacity of 75,000 kw. The initial installation will be 18,750 kw. The power house and equipment will cost about \$2,000,000.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Condition of Pacific Coast Roads Improving Slightly

Freight Traffic Has Not as Yet Created Demand for Equipment—Deliveries Longer Except Steel Products

The condition of electric railways on the Pacific Coast seems to be slightly improved with the advent of the new year. At least there are more encouraging aspects on several of the matters of vital importance to the industry. In Portland a six-cent fare has been allowed by the Public Utility Commission and there are indications that a similar move may materialize in the Puget Sound district. The freight business continues to grow and passenger traffic keeps up in splendid shape considering the fact that it is wartime and winter season. Some roads have been able to cut operating costs by rearranged schedules or different equipment, and war conditions have helped materially in the fight against the jitney.

On the other hand, the municipal ownership idea is not only growing rapidly, but is continually spreading into new quarters, and the financial conditions of the roads has been so long depressed that the freight business or other revenue sources must continue for some time before there can be anything like retrenchment. Even those roads which are enjoying the most of the freight business have not placed orders for any considerable amount of equipment or materials on account of it, although dealers say they still hope for such action.

Since the new year, the demand for such supplies and materials as are used in maintenance and replacements has strengthened notably, but in these lines the demand is spasmodic, so that no special significance attaches. The first California one-man cars to be put in regular city service have been received at Sacramento and four are to be put in operation this month. The Oakland, Antioch & Eastern Railway is reconstructing a few miles of track, and several companies are rehabilitating portions of the system where extensive maintenance has for some time been deferred, but in general little construction work is being done—practically none on new lines.

The Pacific Coast tendency is to order direct from Eastern stocks and immediate delivery from Coast warehouses is not expected. There are so many different electric railway standards that carrying Coast stocks is expensive, and, in some cases, adds 5 to 20 per cent. to cost on account of charges incurred in handling twice, storing and carrying overhead on un-

sold stock. Thus at least the larger purchasers foresee needs sufficiently to place orders in advance long enough to allow for Eastern delivery. On consignments less than 100 lb. by express shipment, delivery is made within a week, and ordinarily freight has required only thirteen to seventeen days. This has now increased to three to four weeks, however.

Deliveries are in fairly good shape except for certain steel products. It is pointed out that many firms which manufacture certain electric railway specialties have only small plants not engaged in government work and have, consequently, not been affected by war orders. About six weeks is the factory time now quoted on a large part of the railway supplies, although three to four months is the average for railway motors; seamless trolley poles are indefinitely delayed, and gears and pinions are rated at nine to ten months.

Prices have shown a tendency to fluctuate, but only a few actual advances have been listed in the past month. Among these are trolley rope and car seats. A slight decrease in car wheels is expected in different quarters of the trade.

Certain Line Materials Advance in Price

One Hardware Line, However, is Lower by 10 Per Cent Because of Stock Accumulation

Prices on line material, which have been abnormally high, have been reduced by an Eastern producer 10 per cent, effective Jan. 15. This manufacturer of hardware had accumulated a surplus stock, and reports say he was obliged to lower his figures to reach a market.

This reduction does not apply generally, and quotations are still high in other directions. Locust pins are still scarce, with prices \$2.50 a thousand higher than previously quoted, effective as of Jan. 15; but this, too, is an exceptional case. Different mills name varying prices, according to location and stock on hand. Rock elm pins are being mentioned as coming into use as a substitute for locust, on account of the scarcity and cost of the latter.

High voltage porcelain insulators have been marked up 10 to 12 per cent within a few weeks, but the low-voltage type remains untouched. Stocks appear to be none too plentiful, while deliveries are slow. High-voltage grades are back four months, caused by slowness of production and delivery, but low-voltage insulators are in a slightly better position.

Effect of the War on Safety Device Market

Trend of Events Indicates that Greater Precautions Will Be Taken to Protect Workers

As the result of the knowledge of the vast sacrifices of human life in the war the minds of business men in this country have undoubtedly become accustomed to and inured against shocks from reports of sudden death or physical disablement. Such a transition in mental processes might reasonably be expected to harden the industrial executive against movements for greater safety in the conditions surrounding plant employees. The facts are, however, that this is not the case. The exact opposite appears to be true. Undoubtedly the reason for this condition is the belief, now practically established, that safety movements are not a matter of sentiment, but are a matter of good business judgment. It has been found a paying investment to spend money to prevent accidents.

That this is the case is evidenced by the increased business among concerns making safety appliances and concerns marketing consulting safety services. Likewise the increased interest in safety movements since the war brought about the present labor shortage is evident through the same channels. The safety device manufacturers generally are very busy. Some have more business than they can handle. When a group of these manufacturers recently met to discuss an annual convention and exposition for 1918 the interest in this event was intense. The National Safety Council of Chicago showed in its recent annual report that its membership had increased 68 per cent in the last year, which means that 1447 industrial and public utility concerns subscribed for consulting safety service in that fiscal year and that the workmen reached by this body then had reached a total of 4,500,000. Shipbuilding plants and others engaged in government business are among latest groups to study and apply accident prevention methods.

In spite of this increased effort, accidents in the last year have slightly increased. This has been caused by the immense labor turnover, necessitating the employment of many "green" men. Leading authorities in safety work say, however, that the number of accidents would have increased at a more marked rate under the existing conditions had it not been for the continued effort to prevent them. This growth in accidents is another factor which has contributed to make the safety-device manufacturer's business active.

Demand for Second-Hand Rolling Stock

Traction Companies All Over the Country Have Difficulty in Getting New Cars—Used Equipment Scarce and High

It is generally known that the builders of new cars are in no position to accept orders for rolling stock for quick shipment, and that deliveries are considerably longer than under normal conditions. In fact, instances have been reported where roads have decided not to place orders with deliveries so far off.

For this reason many traction roads, either because of increased traffic due to greater industrial activity, or being in the vicinity of an encampment or shipyard, or because of demands of the municipality, having found it absolutely necessary to obtain additional cars, have gone into the market for second-hand rolling stock. But now even this source is greatly restricted. This condition was recently revealed most emphatically by inquiries for second-hand cars coming from a number of traction companies. Some of these, it is known, had got in touch with the car builders, and ascertained the facilities of the plants for car construction were curtailed in almost every instance, by government work of one kind or another.

Much to the surprise of the inquirers it was found this description of rolling stock was none too plentiful. The Little Rock (Ark.) Railway and Electric Company is one of these companies. Charles L. Griffith, general manager, is reported as saying: "We have been trying to get cars from Philadelphia and St. Louis, but the car construction shops there are working for the government. I have been all over the country trying to purchase second-hand cars. I succeeded in 'roping in' six. These were only partly equipped."

Another instance is that of the Richmond Light & Railroad Company, operating on Staten Island, New York City. With the establishment of several large shipyards on the north shore engaged in Emergency Fleet Corporation contracts, the road was suddenly called upon to furnish transportation facilities, to and from their daily work in the yards, of a greatly augmented corps of workmen. This it was unable to do without acquiring more rolling stock and other equipment. It being out of the question, for various reasons, to obtain new cars the company scoured the country for second-hand passenger equipment. As a result of the search twenty cars were located in Boston. The price asked, however, rather astonished the prospective buyers, as the Boston people wanted \$6,000 to \$7,000 each, a figure the Staten Island company reported to the Public Service Commission of New York was 20 per cent higher than that of new steel cars when prices were normal.

It is clear, therefore, that with railway companies looking for second-hand rolling stock in lieu of new, because of the inability of car builders to make deliveries, the situation is referred to as serious. Apparently the supply of used cars is also limited, and this further

emphasizes the critical condition. The demand for used stock is large and cars reported on the market find inquiries quickly.

The Brooklyn (N. Y.) Rapid Transit Company (New York Municipal Railway Corporation) a short time ago offered for sale, through a prominent railway equipment concern, a number of used wooden cars, suitable for inter-urban service. A great many inquiries were received from all over the country, and while none of these cars have been sold yet, because they are still in service, present indications are that they will be absorbed by other roads immediately on their release.

Government Copper Price Continued

President Extends 23½-Cent Price Until June 1 on Certain Conditions Making for Maximum Production

On recommendation of the War Industries Board President Wilson on Tuesday extended until June 1 the price of 23½ cents a pound for copper fixed on Sept. 21.

The maximum price was ordered continued on the following conditions: That wages be not reduced, that the producers sell to the Allies and the public copper at the price paid by the government, that necessary measures be taken under the direction of the War Industries Board to prevent copper from falling into the hands of speculators who would increase the price to the public, and that the producers exert every effort to keep up the production to the maximum of the past so long as the war lasts.

Method of Paying for Government Contracts

Under Certain Conditions Manufacturers Will Be Paid for Raw Materials Prior to Manufacture

It has not been particularly clear in the minds of some members of the manufacturing group how the government proposes to pay for the goods it buys. In a proposal recently issued for large quantities of electrical goods the General Engineer Depot made the following statement regarding payment:

"Payment will ordinarily be made for each item as soon as it has been inspected, accepted and delivered, properly packed, f.o.b. cars or boat) at place stated in proposal. Under certain conditions, in the case of standard products the sufficiency of which in their completed form is already known from previous use, partial payments to the extent of a previously agreed upon percentage of the total cost of each component part of the article to be furnished will be made when such component parts are known to be on hand

in the factory ready for assembly. Such component parts will then become the property of the United States, and are to be safeguarded by the manufacturer in a way acceptable to the purchasing officer, in order to prevent loss to the United States through destruction or theft of same."

Rolling Stock

Little Rock Railway & Electric Company, Little Rock, Ark., has recently purchased six second-hand cars, partly equipped.

Tranvias de Oriente, Bogota, Colombia has ordered one five-bench open storage battery car from the Railway Storage Battery Car Company, New York, N. Y.

International Railway, Buffalo, N. Y., lost 100 cars in a fire on Jan. 23 that destroyed the Forest station of the company. The property loss is unofficially placed at \$1,000,000.

Trenton & Mercer County Traction Corporation, Trenton, N. J., has been recommended by Peter Witt, in his report to the City Commission of Trenton, to purchase fifty one-man cars.

United Railways of Yucatan has ordered three 55-ft. all-steel passenger battery cars and two 27-ft. trail baggage and express cars from the Railway Storage Battery Car Company, New York, N. Y.

Illinois Traction System, Peoria, Ill., on Jan. 9 had another motor destroyed at Staunton by fire, its value being given at \$7,000. This makes five cars lost by the company through the same cause in three weeks.

Valdosta (Ga.) Street Railway is reported as rebuilding a recent purchase of cars from the Waycross Street & Suburban Railway, Waycross, Ga., in its own shops, adding automatic air brakes and other improvements.

Compania de Tranvias de Merida, Merida, Mexico, has ordered one twenty-six-passenger, four-wheeled, city-type closed storage-battery car and one five-bench open storage-battery car from the Railway Storage Battery Car Company, New York, N. Y.

Richmond Light & Railroad Company, Borough of Richmond, New York, N. Y., is reported to be in the market for second-hand cars, to increase its transportation facilities to the newly-established government shipyards on the north shore of Staten Island.

Union Traction Company of Indiana, Anderson, Ind., a few weeks ago had an interurban motor car destroyed by fire near Fairmont, Ind. The car caught fire from resistance coils while the motorman was endeavoring to run through a 4-ft. snow drift. Another car of the same description caught fire in the same manner on the same day near Pendleton, Ind., but the damage was limited to the destruction of the floor.

Manila Electric Railroad & Light Corporation, Manila, P. I., will build

fifteen new cars and rebuild a number of old ones in its own shops. The trucks and equipment will be purchased in the United States. New tracks and terminals, with the reconstruction of the overhead trolley system, are further improvements decided upon as the result of a visit to Manila in November last of J. H. Pardee, president, and J. P. Ripley, engineer of the J. G. White Management Corporation, New York, N. Y., which controls the property.

Tri-City Railway Company, Davenport, Iowa, is remodeling four of its summer cars for use in the present winter season, on account of the increased traffic, due largely to the government's activity at the Rock Island (Ill.) arsenal. The company recently purchased twenty summer passenger cars from the Chicago surface lines, which will be rebuilt in Chicago and promised delivery within thirty days. The cars will be distributed among the cities of Davenport, Iowa; Rock Island, Moline, East Moline and Silvis, Ill. The Tri-City Railway Company is attempting to find other cars which may be for sale.

Trade Notes

Baldwin Locomotive Works, Philadelphia, Pa., has appointed A. P. Beuter, in place of A. William Hinger as its representative in Portland, Ore.

C. P. Coleman was elected president of the Worthington Pump & Machinery Company of New York City at a meeting of the board of directors on Dec. 31, 1917.

Johnson Coin Counting Machine Company, New York, N. Y., has moved its Eastern sales office, wrapper and repair departments to 237-239 Lafayette Street, New York.

J. C. Manchester is now district sales manager for the Economy Fuse & Manufacturing Company, San Francisco. Mr. Manchester was formerly connected with the Interstate Electric Novelty Company in that city.

The Esterline Company, Indianapolis, Ind., announces the appointment of J. S. Pandiani, Via Mario Pagano, 27 Milan, Italy, as trade representative for

that country. Mr. Pandiani was until recently manager of the meter and supply department of the Italian Westinghouse Company and will in the future give his attention to the sale of Esterline instruments and permanent magnets throughout Italy.

Nelson P. Hall has taken up the duties of district sales manager for the Chicago territory of the Van Dorn & Dutton Company, gear specialist, of Cleveland, Ohio. His offices are at 14 East Jackson Boulevard.

H. H. Hoxie, sales manager of the Electric Railway Manufacturers' Supply Company, has resigned to become associated with the North Coast Electric Supply at Seattle, Wash., of which Harry Byrne is manager.

The Australian General Railway Signal Company, of Gates, N. Y., has been chartered with a capital stock of \$10,000 by J. S. Fitch, H. Satterlee and L. A. Plumb of Rochester. The company proposes to manufacture railway signals, etc.

William F. Montavon, United States Commercial Attaché at Lima, Peru, advises the Department of Commerce that he has immediate use for catalogs of railway equipment and construction material, and requests that they be forwarded to his office at once.

Moloney Electric Company of Canada, Ltd., Toronto, Canada, announced that it opened a branch office and warehouse at Halifax, N. S., for the maritime provinces. E. A. Seath, who has been transferred from the Montreal office, will have charge of that territory.

Frank J. Foley, manager of the mining section of the industrial department of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has taken a position as manager of the mining and traction department of the Edison Storage Battery Company, Orange, N. J. Mr. Foley, who is a graduate of Pratt Institute, Brooklyn, N. Y., has been with the Westinghouse company for twelve years, commencing with the service department in New York City and later being transferred to East Pittsburgh.

Frank W. Hall has been appointed commercial manager of the Sprague Electric Works of the General Electric Company, New York City. With the exception of a short period Mr. Hall has been connected with the Sprague

Works continuously for twenty-two years in various engineering and sales capacities, and for the three years prior to his present appointment occupied the position of sales manager. D. C. Durland, former executive head of the Sprague Electric Works, has resigned to accept the presidency of the Mitchell Motors Company, Inc.

Western Electric Company, New York, N. Y., will remove the clerical force and heads of departments of its distributing staff from 483 West Street, its present location, to the sixteen-story building on the north side of Twenty-first street, running from Broadway to Fifth Avenue, about the middle of February. The company will occupy the thirteenth, fourteenth, fifteenth and sixteenth floors, comprising an area of about 45,000 sq. ft. The engineering staff requested more room in the West Street building, which necessitated the acquirement of additional quarters.

Cornell S. Hawley, past president of the American Electric Railway Manufacturers' Association, has returned to active connection with the electric railway field, having recently been elected managing director of the Consolidated Car Heating Company, New York, with headquarters at Albany. Mr. Hawley was recently treasurer of the Remington Arms & Ammunition Company, but has completed the work there for which he primarily took the position. Prior to that time he was president of the Laconia Car Company. For many years, however, he was very closely associated with the Consolidated Car Heating Company, whose sales organization might be said for a long time to have represented his active personality. Mr. Hawley's many friends will welcome his return to the electric railway industry.

New Advertising Literature

Vulcan Steel Products Company, New York, N. Y.: The company's illustrated house organ, *Vulcan*, published monthly, is a journal of co-operation and help. The topics discussed cover a wide field, referring more particularly to the export trade, in which it is strongly represented in all the leading centers of the world.

RAILWAY MATERIALS

	Jan. 16	Jan. 23
Rubber-covered wire base, New York, cents per lb.	30	30-33
Wire, weatherproof (100 lb. lots), cents per lb.		
New York	34½-35¼	34¼-38¼
Wire, weatherproof (100 lb. lots), cents per lb.		
Chicago	38-38.35	33½-38.35
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.50	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$2.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.22	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.63	\$2.63
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.29	\$1.31
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.30	\$1.32
White lead (100 lb. keg), New York, cents per gal.	10	10
Turpentine (bbl. lots), New York, cents per gal.	48½	51

NEW YORK METAL MARKET PRICES

	Jan. 16	Jan. 23
Copper, ingots, cents per lb.	23½	23½
Electrolytic, cents per lb.	23½	23½
Copper wire base, cents per lb.	6½	7
Lead, cents per lb.	50	50
Spelter, cents per lb.	8	7 87½
Tin, Straits, cents per lb.	85.00	*\$6.00
Aluminum, 98 to 99 per cent, cents per lb.	35-37	34-36

OLD METAL PRICES—NEW YORK

	Jan. 16	Jan. 23
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19½	19½
Red brass, cents per lb.	17½	17½
Yellow brass, cents per lb.	13½	13½
Lead, heavy, cents per lb.	5½	5½
Zinc, cents per lb.	5½	5½
Steel car axles, Chicago, per net ton	\$42.42	\$42.42
Old carwheels, Chicago, per gross ton	\$30.00	\$35.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.50	\$17.50

*Nominal.



The Peacock's Feathers

You all know the story of a crow which stuck some peacock tail feathers in its own tail and strutted around crying:

"Look at me; I am a true peacock—look at my tail!"

But a gust of wind came along and twisted the camouflage feathers out of Mr. Crow, to his great discomfiture.

Moral: Some brakes may be camouflaged into a superficial resemblance to Peacock brakes, but the first gust of braking trouble reveals them as just plain crow.



National Brake Co.
Buffalo, N. Y.

Bankers and Engineers

Electric Railway, Lighting and Power Company Bonds

ENTIRE ISSUES PURCHASED

THE NATIONAL CITY CO.

NATIONAL CITY BANK BUILDING N. Y.
Correspondent Offices in Twenty-three Cities



STONE & WEBSTER

Industrial Plants and Buildings, Steam Power Stations,
Water Power Developments, Substations, Gas Plants,
Transmission Lines, Electric and Steam Railroad Work.
NEW YORK BOSTON CHICAGO

SANDERSON & PORTER ENGINEERS

REPORTS • DESIGNS • CONSTRUCTION • MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS

RAILWAY, LIGHT AND POWER PROPERTIES

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ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL

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ELECTRIC RAILWAY ENGINEER

WORCESTER POLYTECHNIC INSTITUTE
WORCESTER, MASSACHUSETTS

JOHN A. BEELER

OPERATING AND RATE INVESTIGATIONS
TRAFFIC SURVEYS AND SCHEDULES

52. ELECTRIC RAILWAY MANAGEMENT 2
VANDERBILT SUPERVISION OF CONSTRUCTION COMMONWEALTH
AVE. ENGINEERING AVE.
NEW YORK APPRAISALS BOSTON

D. C. & WM. B. JACKSON ENGINEERS

CHICAGO BOSTON
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Plans, Specifications, Supervision of Construction
General Superintendence and Management
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43 EXCHANGE PLACE NEW YORK
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A. L. DRUM & COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

VALUATIONS AND FINANCIAL REPORTS
CONSTRUCTION AND MANAGEMENT
OF ELECTRIC RAILWAYS

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CHICAGO
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Trinity Bldg. No. 208 So. La Salle St. Washington

Purchase, Finance, Construct and Operate Electric Light,
Gas, Street Railway and Water Power Properties.
Examination and reports. Utility Securities Bought and Sold.

Robert W. Hunt Jno. J. Cone Jas. C. Hallsted D. W. McNaugher

ROBERT W. HUNT & CO., Engineers

BUREAU OF INSPECTION TESTS & CONSULTATION
Inspection and Test of all Electrical Equipment

NEW YORK, 90 West St. ST. LOUIS, Syndicate Trust Bldg.
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PITTSBURGH, Monongahela Bk. Bldg.

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SPECIALIST IN TRANSPORTATION STATISTICS
AND RATE INVESTIGATIONS

Ford, Bacon & Davis, Engineers.

115 BROADWAY

New Orleans NEW YORK San Francisco

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Electrical, Photometrical and
Mechanical Testing.

80th Street and East End Ave., New York, N. Y.

Scofield Engineering Co. Consulting Engineers

PHILADELPHIA, PA.
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HYDRAULIC DEVELOPMENTS ELECTRIC RAILWAYS

Sloan, Huddle, Feustel & Freeman Consulting Engineers

Analytical Studies of financial and operating conditions,
appraisals and rate adjustments of electric railway and
all public utility properties.

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AMERICAN BRIDGE COMPANY

HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes particularly **BRIDGES AND BUILDINGS**



Transmission Towers at Birmingham, Ala., Alabama Power Company

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 PITTSBURGH, PA., Frick Building
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 Detroit, Mich., Beecher Ave. & M. C. R. R.
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 St. Louis, Mo., Third Nat'l Bank Bldg.
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Pacific Coast Representative:

U. S. Steel Products Co. Pacific Coast Dept.
 SAN FRANCISCO, CAL., Rialto Building
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ALUMINUM

Railway Feeders

And all kinds of Electrical Conductors

Aluminum feeders are less than one-half the weight of copper feeders and are of equal conductivity and strength. If insulated wire or cable is required, high-grade insulation is guaranteed. Write for prices and full information.

Aluminum Company of America
 Pittsburgh, Pa.

THE BEST PROOF

of the *NEED* for the Searchlight Section is the large number of requests constantly received by the publishers for information as to where second-hand machinery or certain services can be obtained.

The Searchlight Section

is now the market place where these wants can be made known and filled.

Get your Wants into the Searchlight

When writing the advertiser for information or prices, a mention of the *Electric Railway Journal* would be appreciated.

THE P. EDW. WISCH SERVICE

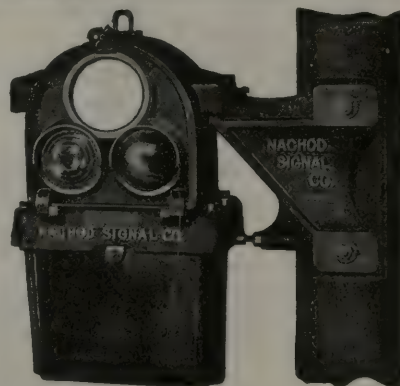
Suite 1710

DETECTIVES

Suite 715

Park Row Bldg., New York

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You Are Never in Doubt

when your road is protected by

Nachod Signals

No matter what your road conditions are, a Nachod will take care of them. There are 7 types of Nachods for all service, from high speed interurban to city travel.

Write for information.

Nachod Spells Safety.

NACHOD SIGNAL CO., Inc.
 Louisville, Ky.

PACIFIC COAST REPRESENTATIVES

BOYLES & SMITH CO., Portland, Oregon, San Francisco, Cal.,
 Los Angeles, Cal.

2224



Collier Service *Secures Patrons for Car Advertising*

If you read car advertisements—and who doesn't?—you must have noticed the number of representative national advertisers.

The purchasers of this advertising service did not beg for admission to the street car racks. They had to be *shown* that street car advertising is profitable.

They were not interested in the car card space alone—they were interested in the message Collier Service could put there.

A visit to the art department of Collier Service just to watch an artist produce an effective card is an eye-opener showing how this organization makes car card advertising an asset for its customers, and therefore an assured income to the Railway Company.

Barron G. Collier
INCORPORATED

Candler Building

220 West 42nd Street, New York City

What an Effective Power-Saving Campaign Can Do for You NOW

It can save coal. And that was never more desirable for your own good or more essential to the public welfare than it is **now**.

It can secure **now** from your platform men co-operation to a much greater degree than would be possible under any normal conditions. The patriotic appeal is a powerful lever. And the habits formed by your men **now** in the correct, safe and economical operation of cars will produce economies for years to come.



Showing recorder location on one of the 1200 cars of the Connecticut Company

The Arthur Power-Saving Recorder

is a valuable factor in such a campaign.

The following figures show what one company has been able to accomplish in five months by persistent instruction in methods of coal and power saving assisted by the use of Arthur Recorders.

The Connecticut Company

New Haven Division

July to November, inclusive

K.W.H. Per Car Mile

Month	1916	1917	% Difference
July	2.985	2.956	0.97% Decrease
August	2.988	2.914	2.48% Decrease
September	2.973	2.882	3.06% Decrease
October	3.142	2.892	7.96% Decrease
November	3.593	3.204	10.84% Decrease

"Power wasted is the true measure of the motormen's relative efficiency."

The Arthur Power-Saving Recorder Co.
New Haven, Conn.



Here are the famous Columbia Electric Hoists

shown contributing to repair shop economy.

Why economy?

Because they are made according to a special design of great simplicity and efficiency.

Will elevate a 50-ton car 6 feet in five minutes, **without swaying.**

Any old traction motor will run them.

Columbia Repair Shop Specialties and Car Equipment Include

TOOLS

Armature and Axle Straighteners
Armature shaft straighteners
Armature buggies and stands
Babbiting molds
Banding and heading machines
Car hoists
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and Axle Bearings
Armature and field coils
Bearings (Axle and Armature)
Brush-holders and brush-holder springs
Brake door and other handles
Brake forgings, riggings, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail shoe beams and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.

Holden & White, Inc., Chicago

F. F. Bodler, San Francisco

Railway & Power Engineering Corp., Ltd., Toronto, Can.



Reduce Maintenance Costs

By Adopting Quicker, Cheaper and Labor-Saving Methods

Maintenance costs are largely affected by the quantity of labor employed and the amount of time required to perform the work.

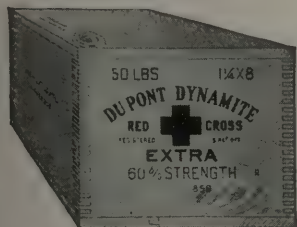
With the track and construction crews reduced by the country's call, every labor-saving agency must be employed to enable the work of track-repairing and extension to be accomplished with the remainder of the force.

By the Use of Red Cross Explosives

to blast earth, shale and gravel ahead of graders and steam-shovels; to demolish culverts, piers, log- and ice-jams; improve drainage conditions; prepare pole and post holes; shatter stumps and boulders it will be found that Red Cross Explosives are actual labor savers in a very practical manner.

Lower Your Expenses

by adoption of labor-saving methods based on the extensive experiences of our field forces while investigating the blasting operations required to construct the nation's railways. Tell us your blasting problems,—let us help you to reduce your maintenance costs. Mention ELECTRIC RAILWAY JOURNAL and send inquiry to Advertising Division.



E. I. du Pont de Nemours & Co.

POWDER MAKERS SINCE 1802
Wilmington, Delaware



Lincoln Bonds Are Not Only Inconspic- uous, Because of Oxidization They Are Also Tenacious



WELDING BOND ON 80-LB. T-RAIL. BOND IN PLACE.
WORCESTER STREET RAILWAY

The tenacity with which Lincoln Bonds hug the rail is the result of a true weld—an intermingling of the copper of the bond into the steel of the rail.

In addition to giving ideal bonding permanence and conductivity, the Lincoln SYSTEM of bonding is also the most economical, since it uses energy with motor-generator efficiency and permits rapid work on *live track* with but one or two operators.

THE LINCOLN BONDING CO.

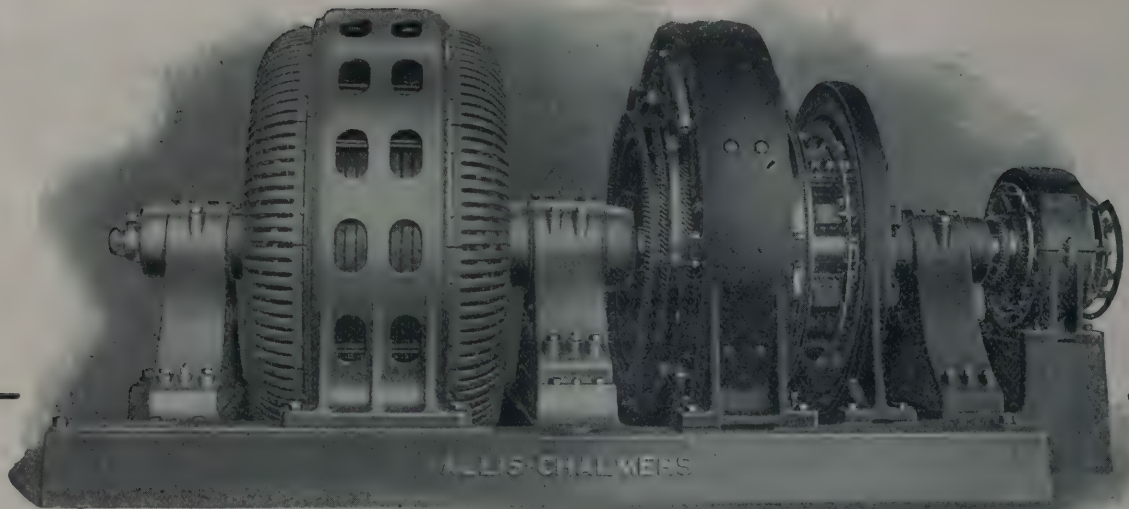
634 Huron Rd., Cleveland, Ohio

AGENTS:

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CHARLES N. WOOD CO.
14 Federal St., Boston, Mass.

HOLDEN & WHITE, Inc.
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808 First National Bank Building
W. H. ELLIOT, Chattanooga, Tenn.



Many Important Railway Systems—

Street and Interurban Railways—Public Service Corporations—Municipal and Industrial Plants—Mining and Smelting Companies—and Numerous other Industries.

Are Using Allis-Chalmers Motor-Generators

These sets are in daily operation and are giving reliable, efficient service.

Our Bulletins show many such installations. Our District Offices will be glad to point out those in your vicinity.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

DISTRICT OFFICES IN ALL LARGE CITIES

FMB Grid Resistors

ARE MADE RIGHT AND STAY RIGHT

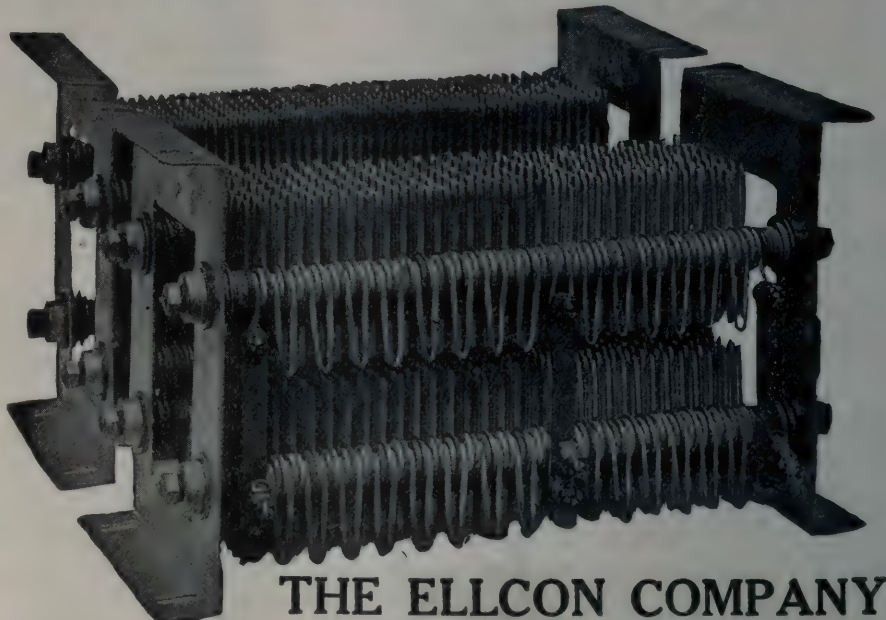
No resistors get more abuse than those under a car.

They are abused electrically by careless operation of the controller.

They are abused mechanically by exposure to dusty, muddy and stone-littered streets.

Until the arrival of E M B drawn, non-corroding grid resistors, troubles from these sources seemed unavoidable.

E M B grid resistors actually have made this part of your equipment troubleproof.



THE ELLCON COMPANY

50 Church Street, New York

WHEN YOU SPECIFY LUMBER FOR

CROSSARMS, TIES,

FENCING, TRUNKING AND CAPPING or any of the hundred and one things that a railway uses lumber for, just bear this important fact in mind:

The cost of the material is generally a small item as compared with the cost of labor for installing it.

When you specify and use ALL-HEART

CYPRESS

"THE WOOD ETERNAL"

for such purposes you know that it is going to give service for a long time, and that you are *not* going to be up against a continuous big *labor cost* for renewals and replacements.

Of course even Cypress may eventually have to be replaced. Nothing lasts quite forever. But in the long service life you get from Cypress you will have *saved* a lot of labor costs in *maintenance alone*.

Anyway, that's why a number of the biggest railways in the country *insist* on ALL-HEART CYPRESS.

"BUY BY THE CYPRESS ARROW."
LOOK FOR THIS MARK ON THE END OF
EVERY BOARD—AND ON EVERY BUNDLE.



Our data is at your service.

SOUTHERN CYPRESS MFR'S ASS'N.

1265 Hibernia Bank Building, New Orleans, La., or
1265 Heard National Bank Building, Jacksonville, Fla.



A Sound Investment

Observations and tests, as carried on under ordinary working conditions by progressive roads in all parts of this country and the world, have showed that uneven, corrugated and indented rails have a damaging influence on the life of both the track and the rolling stock, and that money spent in restoring damaged track to its original smooth, level surface is a sound investment.

RECIPROCATING TRACK GRINDER

—originally designed to work under contract, has met with highest approval wherever tested, because it solved the problems which interfered with the use of other grinding equipment.

Write for particulars.

RAILWAY TRACK-WORK COMPANY

30th and Walnut Streets
PHILADELPHIA, U. S. A.

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & North-western Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



STANDARD STEEL WORKS CO.

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Chicago
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Notice to Subscribers

If YOUR copy does not reach you promptly, do not assume that it has been lost or that it was not mailed.

DELAYS are inevitable just now, in the unprecedented congestion of the mails due to the plight which war-time conditions have plunged the railroads.

PLEASE wait a day or so before you write to us —by that time your copy will probably be in your hands. Save that three cents! But if the delay continues, write us.

THE WAR is no respecter of persons—even Uncle Sam is not exempt from its inconveniences.

ELECTRIC RAILWAY JOURNAL.

Service Insurance

You insure your cars against fire and other losses; why not protect them against service loss also? Idle cars in the barns undergoing repairs instead of producing transportation earn no revenue.

One form of insurance lies in using

MORE-JONES : ARMATURE : BABBITT METAL

It adds to the productive mileage of each car and saves the cost of frequent re-babbitting besides.

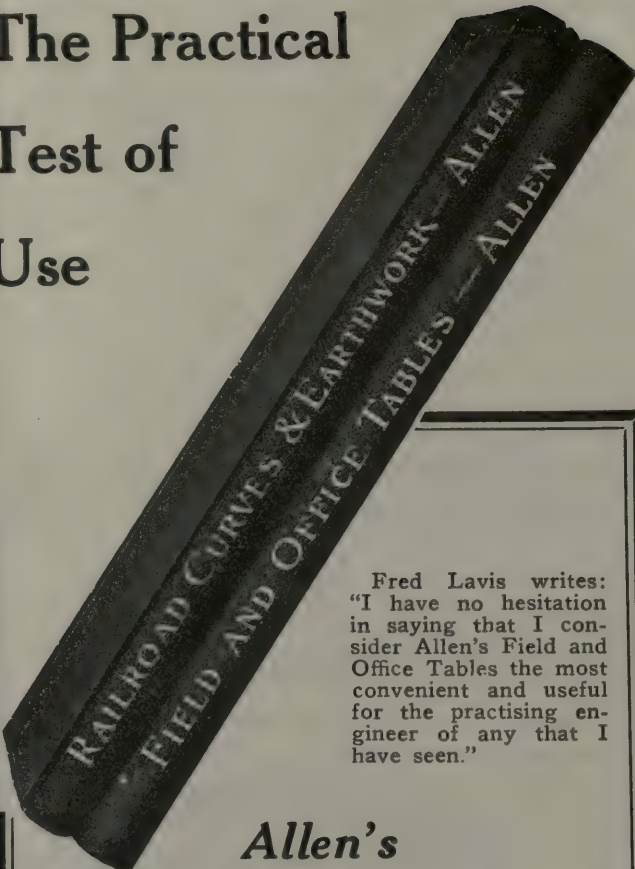
More-Jones Armature Babbitt Metal was originated for armature bearing service exclusively. Scientifically compounded from the purest new metals under chemical and physical laboratory supervision, it flows like quicksilver, never casts a loose box, does not flake or heat and runs true and even. Can be used over and over again without diminishing its efficiency. Recognized the world over for unexcelled quality.

Further information and prices on application

**More-Jones
Brass & Metal Co.**

3134 No. Broadway, St. Louis, U. S. A.

The Practical Test of Use



Fred Lavis writes: "I have no hesitation in saying that I consider Allen's Field and Office Tables the most convenient and useful for the practising engineer of any that I have seen."

Allen's Railroad Curves and Earthwork

234 pages, \$2.00 net, postpaid.

Field and Office Tables

282 pages, \$2.00 net, postpaid.

TWO PARTS IN ONE VOLUME

516 pages, flexible leather, pocket size, gilt edges, \$3.00 net, postpaid.

Engineers engaged in location work find these tables invaluable.

They are equally applicable in every branch of location work—water mains, highways, railways, sewers.

If you are unacquainted with these tables, you owe it to yourself to examine them. You can do this without expense or obligation to purchase. Simply fill in and mail the Free Examination coupon below.

FREE EXAMINATION COUPON

McGraw-Hill
Book Co., Inc.,
239 West 39th St.,
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You may send me on 10 days' approval:

Allen's
.. Railroad Curves and
Earthwork, \$2.00 net.
.. Field and Office Tables,
\$2.00 net.

.. Two parts bound a sone,
\$3.00 net.

I agree to pay for the book or return it postpaid within 10 days of receipt.

— I am a regular subscriber to the Electric Railway Journal.

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(Signed)
(Address)

Reference (E-1-26-18)

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Western "Good Poles Quick" Northern

Quick Shipments
from our
Minneapolis Yard

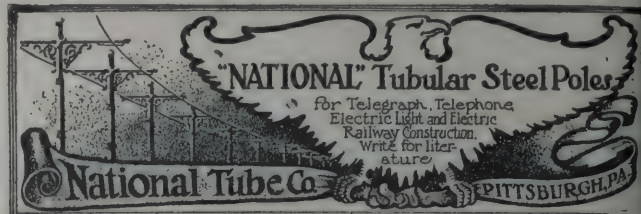
Rooms 832-834, 72 West Adams St., Chicago, Ill.
Spokane - St. Louis

Butt Treating
Open Tank and
"Hot and Cold" Processes

FEDERAL SIGNAL CO. ALBANY, N. Y.

CONSULT OUR ENGINEERS ON YOUR
SIGNAL REQUIREMENTS

52 Vanderbilt Avenue, New York Monadnock Block, Chicago
118-130 New Montgomery St., San Francisco, Cal.



The Trenton

Three Section Tower Outfits to fit any make of chassis.

Write for literature and prices.

J. R. McCARDELL & CO., Trenton, N. J.

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We brag about the SERVICE we give

B. J. CARNEY & CO.

E. B. BRANDE, Manager M. P. FLANNERY, Manager
819 Broad Street Grinnell, Ia. Spokane, Wash.
WM. MULLER & CO., 1729 McCormick Bldg., Chicago.
Commit us to memory.

Wire Rope
and Wire
Insulated
WIRES and
CABLES



JOHN A. ROEBLING'S SONS COMPANY, Trenton, N. J

Aristos "COPPERWELD"—Copper Clad Steel Wire—

Beats Solid Copper 40 Ways

Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs Less to Maintain
GET DATA

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Western Sales Office PAGE STEEL & WIRE Eastern Sales Office
Steel Sales Corporation COMPANY Page Steel & Wire Co.
Chicago, Ill. Monessen, Pa. 30 Church St., New York

Chapman Automatic Signals

Charles N. Wood Co., Boston



Transmission Line and Special Crossing
Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG.

ARCHBOLD-BRADY CO.

Engineers & Contractors

SYRACUSE, N. Y.

Peirce Forged Steel Pins with Sheet Steel Thimbles

Your best insurance against insulator breakage

Hubbard & Company

PITTSBURGH, PA.

EUREKA PRODUCTS

Commutators, Trolley Wheels, Sleet Trolley Wheels,
Trolley Ears, Line Material, Controller Fingers, Brush
Holders, etc

We make quality goods.

THE EUREKA COMPANY, North East, Pa.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Poles, Harps and Wheels,
Bronze and Malleable Iron Frogs, Crossings, Section Insulators,
Section Switches.



Albert & J. M. Anderson Mfg. Co.

289-93 A Street, Boston, Mass.
Established 1877.

Branches—New York, 135 B'way, Phila.
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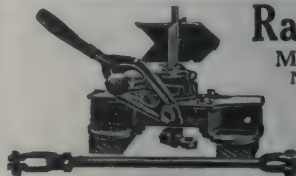
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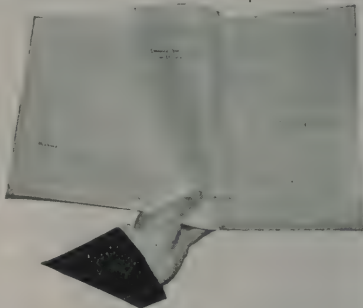
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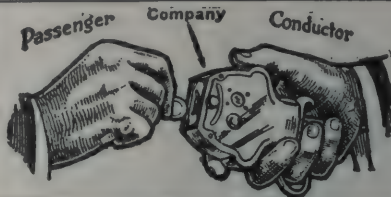
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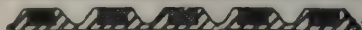
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Park Bldg. Pittsburgh, Pa.

FOR SALE

Electric Locomotive

Weight, 88,000 lbs. 4 G.E.-55, 100 H.P. motors, Type M control, straight and automatic air brake, M.C.B. trucks.

ALBANY SOUTHERN RAILROAD
Rensselaer, N. Y.

CLEVELAND ARMATURE WORKS

Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years.

Two Fairbanks-Morse No. 28

GASOLINE SPEEDERS

FOR SALE

The Aurora, Elgin & Chicago R. R. Co.,
Aurora, Ill.

CAR BARGAINS

OPEN and CLOSED
MOTOR and TRAIL

Write for Prices and Full Particulars to

ELECTRIC EQUIPMENT Co.
601 Commonwealth Bldg. Phila. Pa.

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word**, minimum charge 50 cents an insertion, payable in advance; less 10% if one payment is made in advance for 4 continuous insertions.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want

ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word**, minimum charge \$1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost \$2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/2 p. (1 1/2 x 3 3/4 ins.).....	\$5.00	1 in. (1 x 2 1/2 ins.).....	\$3.00
3/4 p. (2 1/4 x 3 3/4 ins.).....	10.00	4 inches (4 x 2 1/2 ins.)..	11.60
1 p. (3 x 3 3/4 or 2 3/4 x 7 ins.).....	20.00	8 inches (8 x 2 1/2 ins.)..	22.40
1 1/2 p. (10 1/4 x 3 3/4 or 5 x 7 ins.).....	40.00	15 inches.....	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page.....	\$80 a page	18 pages.....	\$56 a page
3 pages.....	72 a page	26 pages.....	52 a page
6 pages.....	64 a page	32 pages.....	50 a page
9 pages.....	62 a page	40 pages.....	48 a page
12 pages.....	58 a page	52 pages.....	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

POSITIONS WANTED

AUDITOR, employed by small traction company, solicits change; 16 years' experience; age 39; married; references. PW-20, Electric Railway Journal, Cleveland.

FREIGHT traffic man; twenty years steam and electric road freight experience; will inaugurate and operate freight on electric line; at present employed; A-1 references. PW-18, Electric Railway Journal.

MARRIED man, 35 years old, with fourteen years' traction experience, six years with city and interurban lines as superintendent of transportation, desires a position with traction company. Prefers city of thirty thousand or less. At present am operating a steam road. PW-13, Elec. Ry. Journal, San Francisco.

SUPERINTENDENT or assistant superintendent of transportation, 40 years of age; expert on schedules; 21 years' experience; willing to go anywhere; best of references can be furnished. PW-6, Elec. Ry. Journal, Chicago.

FOR SALE

Waycross Street Railway

Are dismantling and offer for sale:

- 3—Trailers, J. G. Brill, seat 32
- 1—Flat Car
- 1—Work Car
- 9 Miles 00 Trolley with all fixtures
- 6 Miles 60-lb. Tee Relaying Rail
- 1—Mile Shanghai Rail
- 2 Miles Girder and Chair Rail
- Also 600 tons 35-lb. rail in West Virginia.

Southern Iron & Equipment Co.
Atlanta, Ga.

POSITIONS WANTED

SECRETARY-AUDITOR; strictly high grade man, American, married, aged 34. Thorough accountant and statistician and splendid assistant for operating executive. 15 years' experience steam and electric railway operation. Available after Feb. 1st. PW-16, Electric Railway Journal.

POSITIONS VACANT

COMPETENT track foreman wanted immediately. Must be experienced in street railway work, including electric welding and rail bonding. Salary \$100 per month. Give experience, references, photo, date can report, and all necessary information in first letter. Galesburg & Kewanee Electric Railway Company, Kewanee, Illinois.

DRAFTSMEN wanted experienced in detailing street railway special track work. State experience and salary expected in first letter. Address chief engineer, Buda Co., Harvey, Ill.

EFFICIENT electric railway maintenance man of long, practical experience in charge of inspection, repairs and overhauling of cars; 35 years old; married; now employed; desires a change. PW-14, Elec. Ry. Journal, San Francisco.

FIRST-CLASS armature winder wanted; also first-class machinist. Both positions paying good wages and steady work. P-9, Electric Railway Journal.

HUSTLING working shop foreman wanted. Good wages and reasonable living. P-10, Electric Railway Journal.

NIGHT barn foreman and night controller man wanted for system of 150 cars in Eastern Penna. P-17, Electric Railway Journal, Philadelphia.

MANAGER or general superintendent. Position as manager or general superintendent of city or interurban electric railway. Twelve years' executive and operating experience in all departments. Full particulars upon request. PW-15, Elec. Ry. Journal, Chicago.

MASTER mechanic wanted by up-to-date street railway system in southwest town of 20,000 population. State age, salary and experience first letter. P-1798, Elec. Rwy. Journal, Chicago.

NEW ADVERTISEMENTS

for the

SEARCHLIGHT SECTION

can be received until 10 A.M. Wednesday for Saturday's issue.

POSITIONS VACANT

WORKING foreman wanted to take charge of Line Work for a Trolley Road of about 30 Miles in Eastern Pennsylvania; one who understands trolley and telephone work; must also be handy with tools. P-19, Electric Railway Journal, Philadelphia.

EMPLOYMENT AGENCIES

Correspondence Service

The undersigned provides a confidential service designed to locate openings through correspondence for men earning not less than \$2,500 and up to \$25,000; all lines. Not an employment service, covering individual negotiations. Established 1910. Complete privacy assured; present connections in no way jeopardized. Send name and address only for explanatory details. R. W. Bixby, H1 Niagara Square, Buffalo, N. Y.

WANTED

Rotary Converter

Rotary Converter and Transformers:

- 300 KW. Rotary Converter: 370 AC, 25 cycle, 600 volt DC.
 - 3—13,200/370 volt, 25 cycle Transformers for above Rotary.
- State price and delivery.

SOUTHERN NEW YORK POWER & RAILWAY CORPORATION

Cooperstown, N. Y.

FOR SALE

For Immediate Delivery

Repair Parts

for the following:

- GE-205-B Motors.
- Westinghouse 112-B Motors.
- No. 15 Cooper heater.
- McGuire-Cummings high-speed trucks.
- Westinghouse L-4 Control.

Charles D. Davidson,
Receiver for Gary & Interurban Railroad Co., Gary, Indiana.

RAILS

Locomotives, Cars, Machinery, Piling, Tanks

We've got too much to list here, so we've issued

BULLETIN 230

Get it now!

68 pages

ZELNICKER IN ST. LOUIS

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry
with Names of Manufacturers and Distributors

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg. Co.

Air Rectifiers.
Holden & White, Inc.

Alloys, Steel & Iron.
(See also Bearings & Bearing Metals.)
Titanium Alloy Mfg. Co.

anchors, Guy.
Electric Service Supplies Co.
Holden & White, Inc.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

anti-Climbers.
Railway Improvement Co.

Armature Shafts.
Laclede Steel Co.

Automobiles and Buses.
Brill Co., The J. G.

axle Straighteners.
Columbia M. W. & M. I. Co.

axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
General Electric Co.
Laclede Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Bankers and Brokers.
National City Co.

Batteries, Storage.
Electric Storage Battery Co.

Bearings & Bearing Metals.
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
More-Jones Brass & M. Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side.
Baldwin Locomotive Works.
Holden & White, Inc.

Bearings, Roller and Ball.
Gurney Ball-Bearing Co.
S K F Ball Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Blasting Powder and Equipment.
Du Pont de Nemours & Co., E. I.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.

Boiler Tubes.
National Tube Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
American Steel & Wire Co.
Electric Service Supplies Co.
Ohio Brass Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Service Supplies Co.
General Electric Co.
Lincoln Bonding Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms.
(See also Poles, Ties, Posts, Etc.)
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Bates Expanded Steel Truss Co.
Electric Service Supplies Co.
Hubbard & Co.
Lindsley Bros. Co.
Ohio Brass Co.

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Holden & White, Inc.
Smith-Ward Brake Co.

Brake Shoes.
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Long Co., E. G.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White, Inc.
Horne Mfg. Co.
Long Co., E. G.
National Brake Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

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American Bridge Co.

Brooms, Track, Steel or Rattan.
Western Electric Co.
Zelnicker Supply Co., W. A.

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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

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American Carbon & Battery Wks.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
United States Graphite Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.
Dixon Crucible Co., Jos.
United States Graphite Co.

Bunkers, Coal.
American Bridge Co.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

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Electric Car & Locomotive Corp.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. O.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
Frankel Connector Co.
Horne Mfg. Co.
More-Jones Brass & Metal Co.

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American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

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Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
Long Co., E. G.
St. Louis Car Co.

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Electric Service Supplies Co.
Holden & White, Inc.
Horne Mfg. Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car.—(See Head Lining.)

Certified Public Accountant.
Swan, James T.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
Cutter Electrical & Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers, Track.—(See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.
Root Spring Scraper Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling.—(See Conveying and Hoisting Machinery.)

Coasting Recorders.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Wood Co., Chas. N.

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Long Co., E. G.
Westinghouse Elec. & Mfg. Co.

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Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Trac. B. Co.

Condensers.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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Frankel Connector Co.

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Electric Service Supplies Co.

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Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
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General Electric Co.
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Long Co., E. G.
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Samson Cordage Works

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Electric Service Supplies Co.
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Allis-Chalmers Mfg. Co.
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Electrical Indicating Instruments

are unqualifiedly superior to any other instruments designed for the same service.

A. C. or D. C. Switchboard or Portable Instruments for every field of Indicating Electrical Measurement. In writing for catalogs and bulletins, please specify the field that interests you.

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 21 Weston Ave., Newark, N. J.
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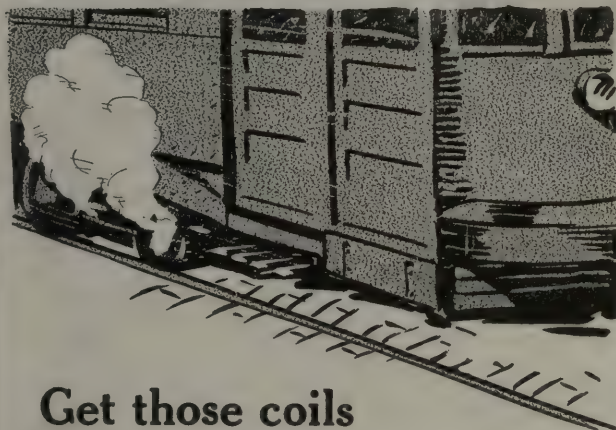
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The Baldwin Locomotive Works

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Get those coils back into service—quick!

Don't let LABOR SHORTAGE hold them up in your coil department. You can't get more men—but you can save time and money by sending the coils to us for re-insulation with

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We will return them promptly—better insulated and more durable than when new.

"Salamander" asbestos wire excels in insulating value and cannot burn out under the severest overload.

Leading electric railways are our best customers.

Write us for details now.

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OFFICES: 1737 Broadway, New York FACTORIES: York, Pa., and Weehawken, N. J.

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Detective Service.
Wisch Service, P. Edward

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Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Richey, Albert B.
Sanderson & Porter.
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Sloan, Huddle, Feustel & Freeman.
Stone & Webster Eng. Corp.
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Westinghouse Elec. & Mfg. Co.

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Allis-Chalmers Mfg. Co.
Westinghouse Elec. & Mfg. Co.

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International Register Co., The

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American Steel & Wire Co.
Page Steel & Wire Co.

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Consolidated Car Fender Co.
Electric Service Supplies Co.
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National Ry. Appliance Co.

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Scaife & Sons Co., Wm. B.

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American Mason Safety Tread Co.

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Westinghouse Elec. & Mfg. Co.

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Kerschner Co., Inc., W. R.
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National Ry. Appliance Co.
Nuttall Co., R. D.

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General Electric Co.

Generators.
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

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Morgan Crucible Co.

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General Electric Co.
Railway Track-work Co.

Guards, Cattle.
American Bridge Co.

Guards, Trolley.
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.

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Electric Service Supplies Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.

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Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Long Co., E. G.
Ohio Brass Co.
St. Louis Car Co.

Headlining.
Kerschner Co., Inc., W. R.

Heaters, Car (Electric.)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water.
Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car (Stove.)
Electric Service Supplies Co.
Smith Heater Co., Peter.

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Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.

Hose, Bridges.
Ohio Brass Co.

Hydraulic Machinery.
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Hydrogrounds.
Horne Mfg. Co.

Inspection.
Electrical Testing Lab's.
Hunt & Co., Robt. W.

Instruments, Measuring, Testing and Recording.
Economy Electric Devices Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Weston Elec'l Instrument Co.

Insulating Cloth, Paper and Tape.

Diamond State Fibre Co.
General Electric Co.
Horne Mfg. Co.
Mitchell-Rand Mfg. Co.
Sherwin-Williams Co.
Standard Paint Co.
Standard Woven Fabric Co.
Westinghouse Elec. & M. Co.

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Anderson M. Co., A. & J. M.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Holden & White, Inc.
Horne Mfg. Co.
Mitchell-Rand Mfg. Co.
Sherwin-Williams Co.
Westinghouse Elec. & M. Co.

Insulators. (See also Line Material.)

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Insulator Pins.
Electric Service Supplies Co.
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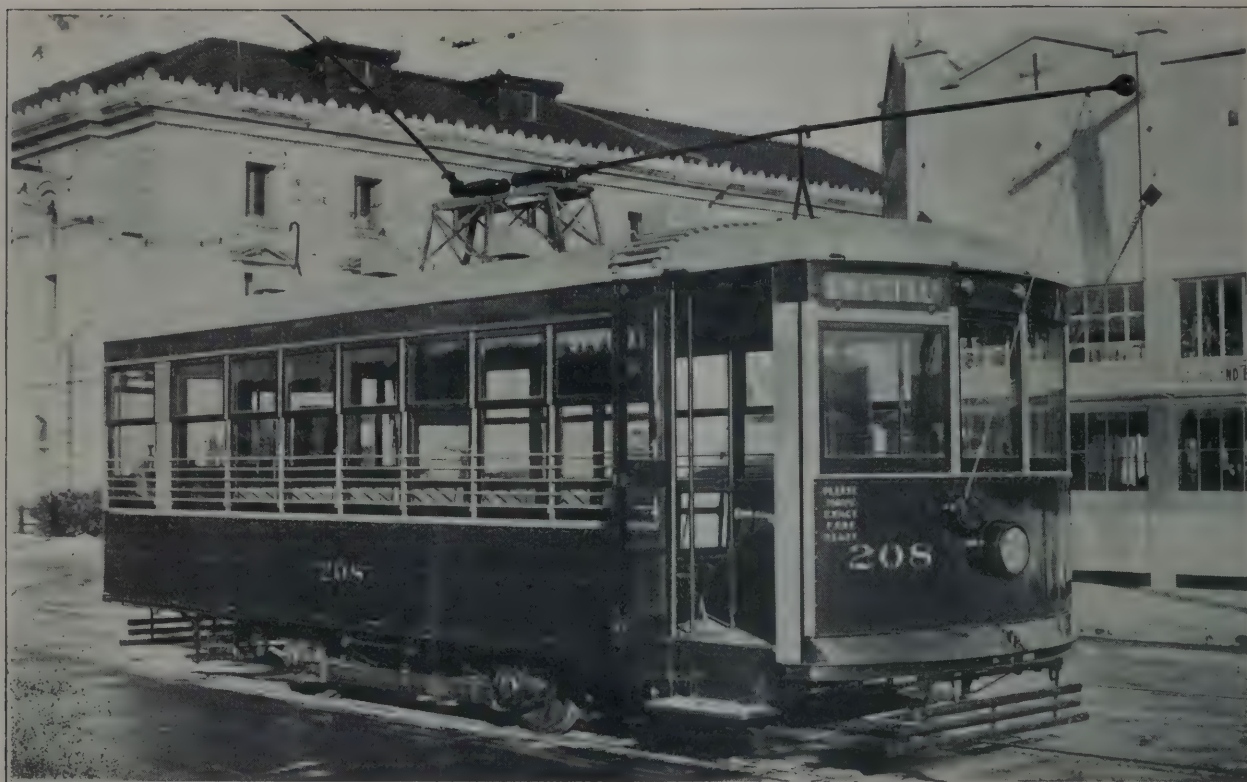
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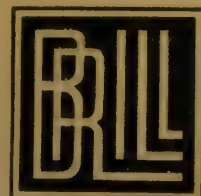
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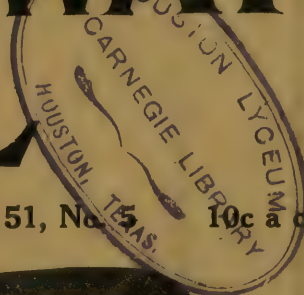
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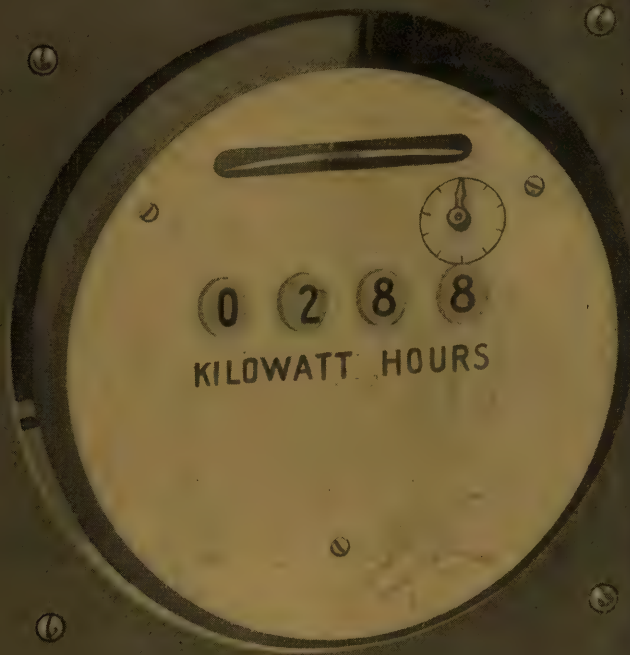
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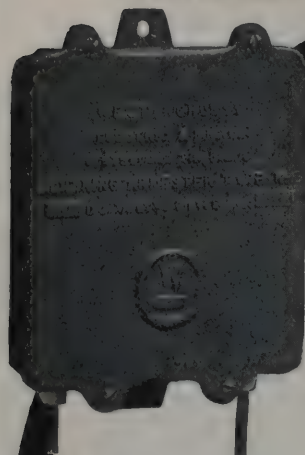
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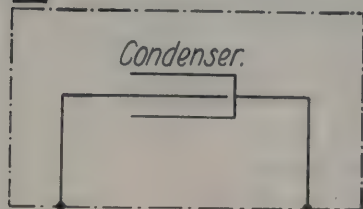
Type K-3 Arrester without Spark Gap and Resistance



Type K Arrester with Spark Gap and Resistance, showing accessibility of Spark Gap Chamber

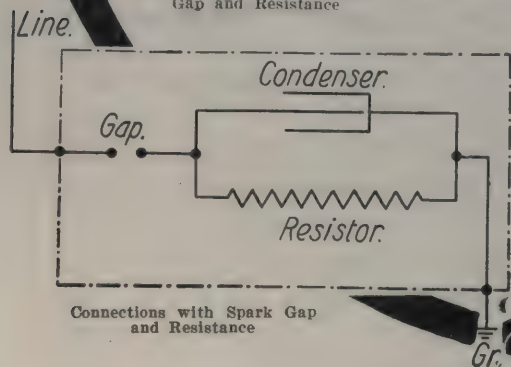
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St. Paul, Minn.



77 SAFETY CARS

shipped to Stone & Webster properties during the last sixty days.

77 SAFETY CARS

in addition to those shipped, have been ordered by the same properties during the same period. These cars will operate in

SEATTLE—TACOMA—TAMPA—FT. WORTH

All equipped with our Safety Car Control Equipment. The Safety Car is now the Standard Car in many cities.

SAFETY CAR DEVICES CO.

St. Louis
Boatmen's Bank Bldg.

Chicago
Ry. Exch. Bldg.

New York
City Invest. Bldg.

Pittsburgh
Westinghouse Bldg.

Canada—Canadian Westinghouse Co., Ltd., Hamilton, Ont.



There's a Reason Why

INTERNATIONAL STEEL TWIN TIES

Are Being Used in Larger Quantities Each Year

Users know that our claims for labor and material savings are not exaggerated—50% reduction in excavation and concrete quantities over that required for similar wooden tie construction.

50% reduction in labor over that required for any other form of track construction.

Minimum maintenance because of the large tie bearing area, and the combination of all permanent materials insures long life.

All these claims have been conclusively demonstrated by Steel Twin Tie users in the past nine years.

Ask our users; they'll be glad to verify these claims.

Our large stock of low priced steel will insure a moderate price and quick delivery.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

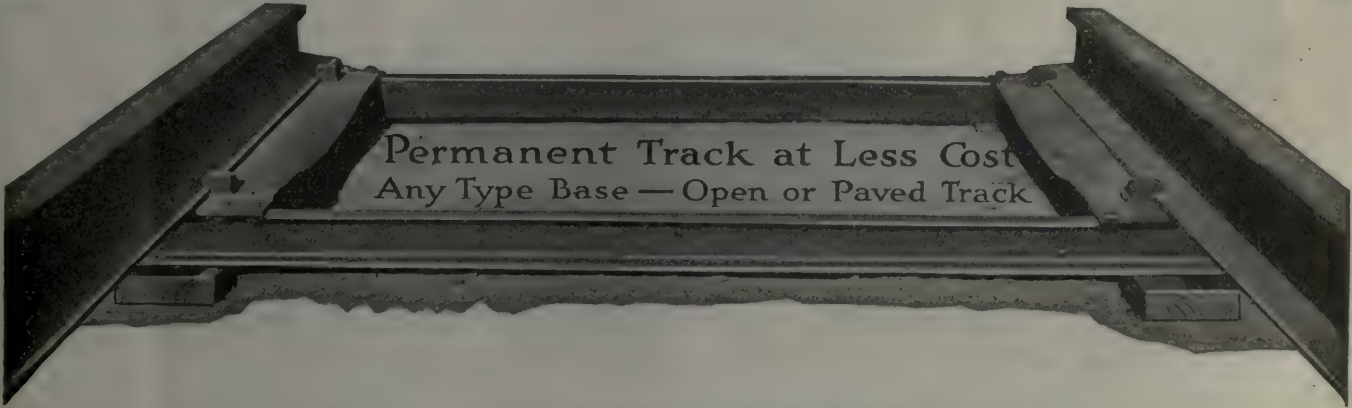
Western Eng'g Sales Co., San Francisco, Cal.
Los Angeles, Cal. Seattle, Wash.

R. J. Cooper Co.,
Salt Lake City, Utah.

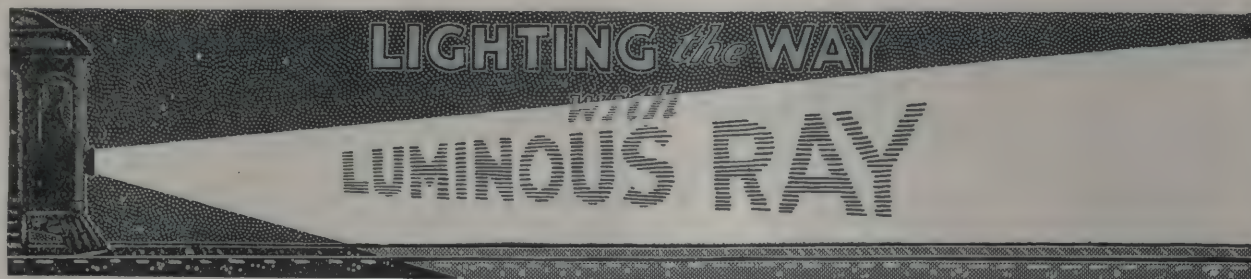
J. E. Lewis & Co.,
Dallas, Texas.

Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.



Permanent Track at Less Cost
Any Type Base — Open or Paved Track



Imperial Luminous Arc Headlights *Give Safe Light on Low Voltage*

Out toward the end of the line or during accelerating periods, or on a steep grade the voltage usually drops below normal. But safe operation requires a strong, dependable light just the same.

If Imperial Luminous Arcs are "Lighting the Way with Luminous Ray" a brilliant beam of light is cast far ahead of the car even though the voltage is much less than it should be.

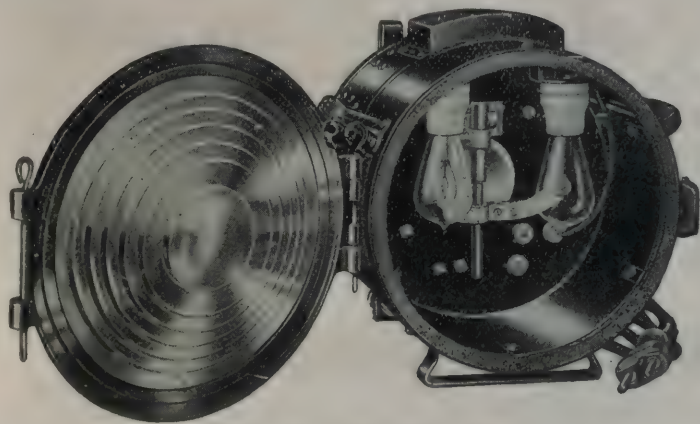


Type LAA—Luminous Arc and Incandescent.
(Incandescent lamps are used when running through lighted streets of cities or villages)

Imperial Headlights are ruggedly built. The case is reinforced by an air-tight partition which shields the mechanism in the rear from the fumes and deposits of the electrodes in the front. They stay on the cars with a minimum amount of attention and care.

There are several types of Crouse-Hinds Imperial Luminous Arc, Carbon Arc and Incandescent Headlights. Each has a field of its own. Our experts will be glad to help you make a selection based on your particular conditions.

A demonstration may be arranged on your own cars. Ask about it.



Type LAA—Front door open

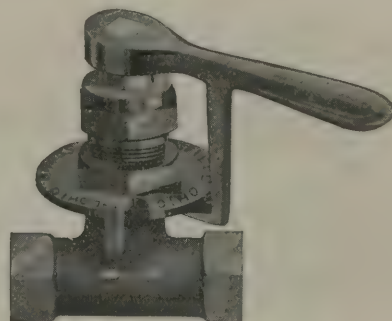
The Ohio Brass Company, Mansfield, Ohio

New York Philadelphia Chicago Los Angeles San Francisco

General Sales Agents in U. S. for Crouse-Hinds Imperial Headlights



O-B Air Sander Valve
Diaphragm Type—Form 1
(Patented)



O-B Air Sander Valve
Independent Type

O-B Air Sander Equipment *Safe and Saving*

Safe because it is reliable—always ready for duty; saving because it is efficient in design—prevents waste of air, O-B Air Sander Equipment should be on your cars.

Diaphragm Type Valve has a plunger made in two parts which are separated by an air-tight, flexible metal diaphragm. None of the air can get out around the stem. All of it is used for sanding.

Diaphragm Type Valve is located near the engineer's valve. A slight pressure on the handle applies sand. The valve closes automatically.

In some cases it is more desirable to use the Independent Type, which opens or closes with a quarter turn. Handle can be removed only when air is shut off.

Reducing Valve enforces economical use of air. It is set to pass just enough air to apply the right amount of sand when the valve is wide open.

Trap has smooth passage so it does not clog readily.

Wire Sander Hose can be placed so that all the sand is applied to rails on curves or on tangents.

Pages 587-591 of Catalog No. 16.



O-B Reducing Valve



O-B Air Sand Trap
Sectional View



O-B Wire Sander Hose

The Ohio Brass Company, Mansfield, Ohio
New York Philadelphia Chicago Los Angeles San Francisco



Sturdy Northern White Cedar Poles

The above view shows lines of the Columbus Railway Power and Light Company, Columbus, Ohio, looking north on Cozzens Street.

Over 19 Years in the Line

The poles are 40 foot Northern White Cedar and were set in 1898. There have been no replacements in this extensive line and the poles are in good condition. They support the following load:

21—500,000 C. M. W. P. Stranded	25—4/o W. P. Solid
2—300,000 C. M. W. P. Stranded	4—3/o W. P. Solid
5—250,000 C. M. W. P. Stranded	

Northern White Cedar Poles resist decay through many years. Their large percentage of heart-wood adds strength. Low first cost. Low maintenance cost. Light in weight. Easier to transport and erect.

Sold under Northern White Cedar Association
Specifications which insure a high standard of quality

NORTHERN WHITE CEDAR ASSOCIATION

LUMBER EXCHANGE

MINNEAPOLIS, MINN.



Interurban Type
Stationary

***Bright, cheery, efficient
“Golden Glow” Light—
an excellent antidote for
this troublesome period
of conservation.***



Interurban Type
Portable

The various types of “Golden Glow” Headlights for interurban service all project powerful, penetrating, steady, non-blinding beams of “Golden Glow” light—a volume of light actually greater than the average arc headlight projects.

The types for city cars project this same powerful, non-blinding light without any greater current consumption than the old inefficient types of headlights.

The secret lies in the high efficiency of “Golden Glow” greenish glass reflectors and the general make-up of the headlight through and through.

Therefore when you adopt “Golden Glow” on your cars you are buying headlights scientifically correct in principle and design.

Place your order now, and soon your cars will be headed by beams of cheery “Golden Glow.”



City Type

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church Street

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



“ELRECO” STRAIGHTNESS

There is far more than meets the eye in the absolute straightness of the “Elreco” tubular poles.

It is because they are tubular and perfectly cylindrical that “Elreco” poles are always straight and true in the ground.

Their circular shape takes all overhead strains, for “Elreco” tubular poles are designed in the only shape that combines the highest limit of efficiency with minimum weight.

For Sheer Strength and Sheer Elegance

“Elreco” poles must be your choice next time you are in the market for poles.

Get catalog No. 16 which tells all about “Elreco” poles and also about “The Wire Lock” and “The Chamfered Joint,” two features which mark “Elreco” pole-work as the standard of pole engineering.



Observe the
WIRE LOCK

ELECTRIC RAILWAY EQUIPMENT CO.

CINCINNATI, OHIO

New York: 30 Church Street

Phono-Electric

Why San Francisco Prefers Phono-Electric

The experience of the United Railroads of San Francisco with various kinds of trolley wire at its great proving ground—the Market Street ferry loops—has led to the choice of Phono-Electric Trolley Wire for this and other locations.

An installation which gets pretty nearly all the types of cars in the city, which has a dozen different offsets and heights of wire and which carries 124 cars an hour on the outer loop alone is quite a proving ground.

Bridgeport Brass Company
Bridgeport Connecticut



Phono-Electric welcomes proving-ground comparisons



Penetration

These two products have proved their superiority

The success of this company is due above all to one thing—*dependable quality*. Every Reilly product—from first to last—has been made to do its work *better* than it could be done by any other product known to science.

Reilly creosote oils have never been by-products of the production of other materials. Hence it has been possible for us to turn out products that were both *uniform* and *perfect* in quality.

For this reason, our two most recent and most meritorious products have received generous and serious consideration on the part of those interested in the preservation of wood.

Reilly's Improved Creosote Oil

(PATENTED)

The finest fruit of over twenty years experience. Superior to any previous creosote oil for use with the empty cell process.

Absolutely free from the volatile oils, coal tar or other adulterants. Contains more than *three times as much* permanent properties as the next best oil. At 250 degrees C. less than 1% distills. And at 315 degrees C. more than 75% remains undistilled. So permanent is its nature that it *stays in the wood forever*.

Reilly's Wood Preservative Oil

(PATENTED)

By far the best creosote oil ever produced for open tank or brush treatment. Produced by a patented process that gives this oil a much *higher boiling point* than any other pure creosote oil product.

Freedom from the volatile oils and precipitates gives it deepest and most *permanent* penetration.

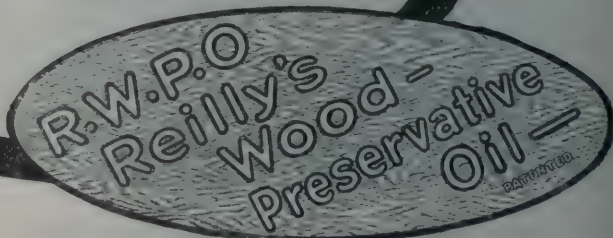
Absolutely proof against the action of heat, cold, drought, water, decay and insect attacks. It coats the surface and fills the wood structure with an impermeable mass of permanent oil. We have the goods and can make prompt shipments. Especially good delivery in tank cars. Write for prices and samples for test. No other refinery is manufacturing these grades of creosote oil as our process is patented.

Republic Creosoting Company

Indianapolis, Indiana

PLANTS: Indianapolis Minneapolis Mobile Seattle

Permanence



Steel for Service**Street Railway Track**

Since 1903 the Carnegie Steel Company has been engaged in the manufacture of steel cross ties for steam and electric railway service, industrial track, etc.

It has given to the development of steel cross ties the skill gained by years of experience in their manufacture, and on the basis of that experience recommends steel tie construction for street railway track in paved city streets of the highest class where economy in ultimate expenditure may be secured and where the necessity for renewals and repairs should be reduced to a minimum.

The illustrations show steel cross ties installed on Euclid Avenue, Cleveland, Ohio.

**Carnegie Steel Company**

General Offices—Pittsburgh, Pa.

Where the purchasing power
of a dollar is greater than dur-
ing the pre-war period

Paradox—

Indianapolis Reclamation Materials and Economy Products

Which save the most money per dollar expended
have advanced the *least* in cost.

Percentage of Advance—Scale		
"Indianapolis" Electric Welders.....	—%	
"Indianapolis" Fluxated Welding Steels	20%	—
"Indianapolis" Welded Joints and Bonds	70%	——

The above "Dividend Builders"—which effect
a saving of from \$10.00 to \$1000.00 for every
dollar invested—are immediately available
New material is not.

Indianapolis R-N-R Solid Manganese Frogs	110%	————
Indianapolis M-M Solid Manganese Crossings	125%	————

The above Economy products have many times
the life of Fabricated Material; practically no
maintenance.

Copper Wire	137%	————
Rail Frogs, Switches, Crossings and Spikes	200%	————
Malleable Parts	225%	————
Cast Steel Parts	290%	————
Forged Parts	300%	————
Tool Steel	400%	————

Maintain and improve your physical condition—
Conserve material and labor.

Indianapolis Switch & Frog

An old story is no worse for being told twice if it's a good story and when the occasion for repetition is most opportune

Indianapolis Welded Joints

Are the subject of our story. You know what they have done for hundreds of electric railways when price, material and labor conditions were normal. Consider how much more valuable they are today, when everything that goes into the construction and up-keep of electric railways has gone up enormously except



Indianapolis Joints and Welding Supplies

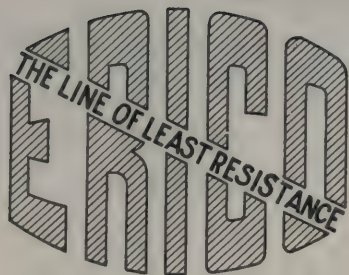
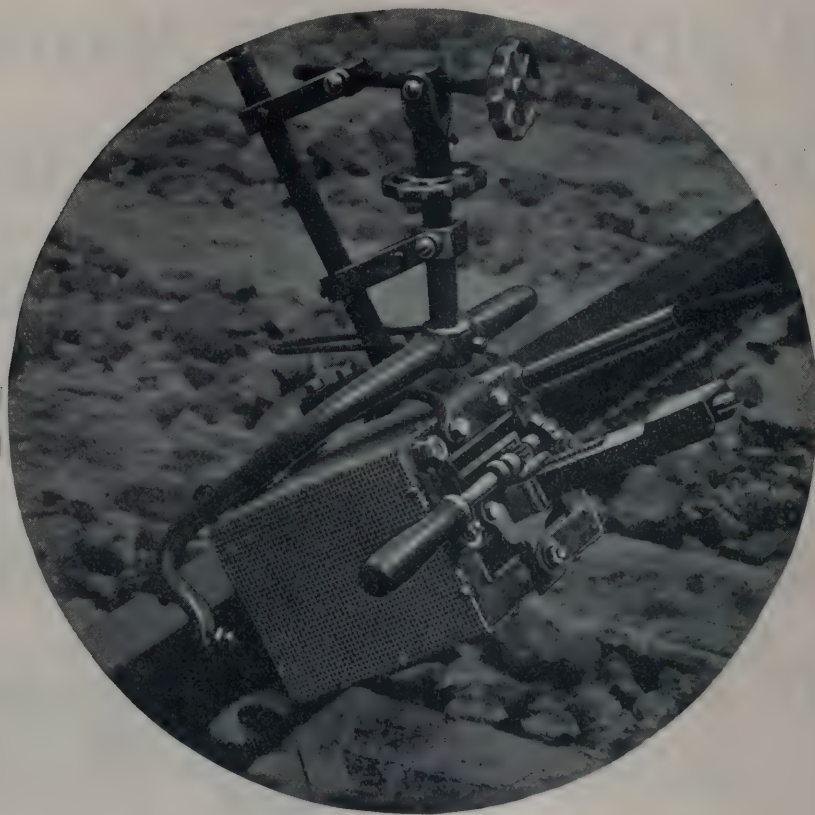


The track that you could not relay last year has got to be taken care of this year. With another **harder** year of rail famine ahead the time-tried Indianapolis way of making new track out of old will mean more to you than ever.



The Continued Increased Growth in Popularity of Indianapolis Welded Joints.

Company, Springfield, Ohio



*Nothing could be simpler
than the*

WELDER PORTION

of the

ERICO Portable Bond Welding Outfit

It weighs only 65 pounds complete with mounting and consists essentially of an electrode, an arc chamber and a magnet winding by means of which the arc is focused on a graphite plate that bears against the bond terminal. No flame or arc strikes either the bond or rail. There are no revolving parts to get out of order.

This light and inexpensive welder attaches the famous ERICO Bonds to the rails in a way that insures a permanent contact of low resistance.

Rheostat used in connection with welder weighs 140 lbs.

FOR TRULY PERMANENT BONDING WITHOUT INJURY TO THE RAILS, GET THE ERICO PORTABLE WELDER.

The Electric Railway Improvement Co.
Cleveland

A New Service

for Producers of
Everything
That Electric
Railways Need

PRACTICALLY everybody who does business or can do business with electric railway companies knows how thoroughly the *Electric Railway Journal* carries a business message to the important executives of the field. Its circulation of 7300 copies a week saturates the industry completely from the executive

heads down to the department managers. The bulk of its readers are the officers and most important department heads of the roads which operate 99 per cent of all cars and own 98 per cent of the total electrified mileage in the United States and Canada, to say nothing of the most important electric railways throughout other parts of the world.

No publication can cover its field more thoroughly.

Conditions have developed, however, which make it possible and desirable to provide a still more extensive service to the industry which heretofore no paper has given. A service which those who do business with electric railway companies will welcome—a service which will hereafter be performed for the field and for the manufacturers who depend upon it—by a monthly

Mechanical Edition

—of the

Electric Railway Journal

beginning February 23
and to be issued the
**THIRD SATURDAY
OF EVERY MONTH**
thereafter

THE monthly *Mechanical Edition* will appeal to the many men down the line, especially those in the mechanical, engineering and way departments. These men who while not yet

interested in the financial, public relations, legal and labor problems, are still hungry for help in performing the many mechanical and electrical tasks under their direction.

While these men are relatively "down the line" they exert a most potent influence in the choice of equipment and materials used in construction, operation and maintenance. They are, indeed, a primary influence in determining what shall or shall not be purchased. Their favorable or adverse opinion of what goes into cars, power houses and substations, on the track or line may make or break any manufacturer who caters to the electric railway industry.

To these important men, the Electric Railway
Journal's Monthly Mechanical Edition
is sold separately at a subscription
price of a dollar a year

Thus advertisers in the *Electric Railway Journal* will have, at no extra cost, an **added** circulation of extreme value in the third issue of each month. The extra subscribers reached by the

Mechanical Edition include men of the following classes:

Assistant Master Mechanics
Assistant Superintendents of Equipment.
Assistant Superintendents of Rolling Stock

Foremen of Truck Shops
 Foremen of Electrical Shops
 Foremen of Paint Shops
 Foremen of Woodworking Shops
 Foremen of Air Brake Shops
 Inspectors and Testers of Materials
 Draftsmen
 Chief Clerks of All Mechanical Departments
 Assistant Chief Engineers
 Assistant Power Engineers
 Assistant Electrical Engineers
 Foremen of Transport such as conveyors, industrial railways, coal and ash-handling equipment, etc., used in the power station
 Foremen of Boiler Rooms
 Foremen of Turbine Rooms
 Chief Switchboard Operators
 Assistant Engineers of Transmission and Distribution
 Substation Operators
 Assistant Line Engineers
 Line Foremen
 Foremen of Line Department Shops
 Assistant Engineers of Track and Structures
 Assistant Civil Engineers
 Assistant Way Engineers
 Assistant Superintendents of Buildings and Bridges
 Track Foremen
 Foremen of Track Department Shops

THIS is but a partial list. Yet it indicates the scope of the *Mechanical Edition*. These men form an audience which heretofore has never been completely served by a paper that goes into the fundamentals of their work or which made a business of helping to

solve their many problems. Naturally, the publication that now performs this unique and valuable service becomes, automatically, an advertising medium of exceptional value.

How Manufacturers Can Utilize Electric Railway Journal's New Service

MANUFACTURERS who do business with Electric Railways should use the regular weekly edition of the *Electric Railway Journal* to carry their business messages to the higher electric railway executives. These men read their Journal every week. It is known among them as "The Bible of the Industry." They are the men who have the final say on all larger purchases and on all matters involving a change of policy or standards. They are the real directing and guiding heads of the electric railway field.

The same advertisers should use ample space in the monthly *Mechanical Edition* (which goes to the regular weekly subscribers as well as to the mechanical men who subscribe only for

the monthly edition) to carry an educational message to the important men "down the line," with whom the buying stimulus so frequently originates.

Use the Electric Railway Journal every week to impress the executives so that the recommendations of the me-

chanical man will meet with a prompt O. K.

Use the monthly Mechanical Edition to show the mechanical man how and why your product or services will make his work easier, more efficient and more economical to his Company.

Do This Now!

PREPARE a special advertisement for the first issue of the *Mechanical Edition*, February 23. A strong full page or double page spread will give you a running start with the important readers which the Journal's new service now brings you.

1500 Extra Copies Will Be Printed

They will reach the men who have never been reached with 100 per cent effectiveness by your advertising. They are men whose influence counts heavily. Cultivate it. Start strong.

Last day to get copy and cuts to us—

February 15

If you wish us to prepare and submit copy for your consideration, write or wire to-day.

Better wire.

Send it "collect," but do it now.

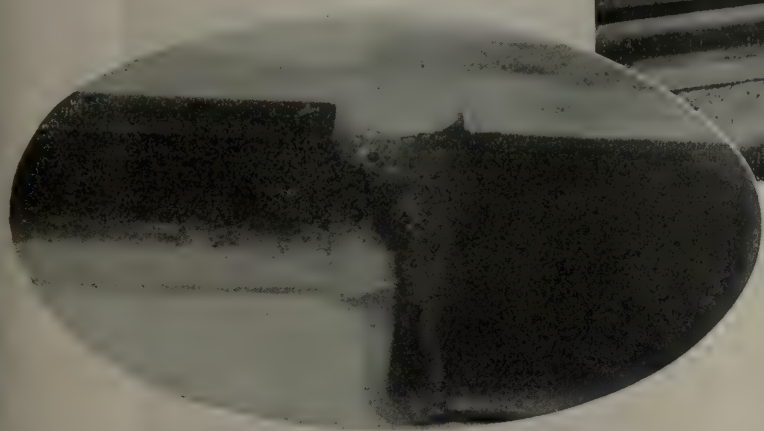
Electric Railway Journal

Tenth Avenue at 36th Street

New York

Member Audit Bureau of Circulations

When the
Groove Rail becomes
a T-Rail



*Look for
the Connection*



In nine cases out of ten

Goldschmidt Thermit Insert Welds

are relied upon to produce that smooth and reliable continuity of rail which is such an important factor in track maintenance, and which exercises such a noticeable influence on the wear and tear of the entire rolling stock.

Goldschmidt Thermit Company

Maker of the Famous Thermit Rail Weld

120 Broadway, New York

329-333 Folsom St., San Francisco
7300 So. Chicago Avenue, Chicago

103 Richmond St., W., Toronto, Ont.
1427-1429 Western Avenue, Pittsburgh



What Happens to a Rolled Rail Crossing



How a Balkwill Articulated Cast Manganese Crossing Behaves

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of a rolled rail crossing are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill articulated cast-manganese crossing the difficulty is

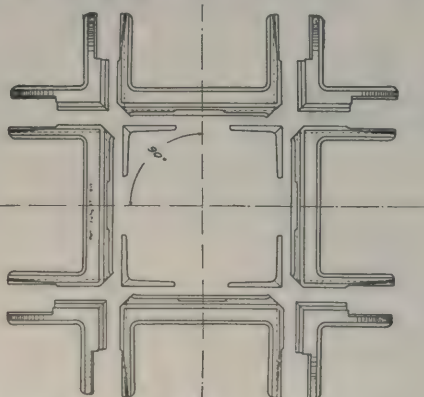
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, DON'T ACCEPT A SUBSTITUTE but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings
Direct from Your Special Work Manufacturers**

The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio

Notice how well a few men can handle "Armco" Iron Corrugated Culverts



Labor scarcity—skilled and unskilled—is bound to continue and, indeed, the situation is likely to grow even more acute. You will do well to consider carefully this factor when you specify culverts.

"Armco" Iron Culverts require neither skilled labor nor heavy tackle—ordinary labor is all you need. A few laborers can handle and place "Armco" Iron Culverts with less effort than required with any other type of construction. Where "Armco" Iron is used, the ditch is often opened, the culvert placed and covered and traffic resumed the same day.

Another point: "Armco" Iron Culverts are Built to Last—and they do it! Only the purest and most durable of irons is used in their construction so that they resist rust far better than ordinary material. Get the best for your road.



Resists Rust

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neill Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Munsey Bldg., Baltimore
Wm. M. Baker.
Massachusetts, Palmer
New England Metal Cul. Co.
Michigan, Bark River
Bark River Bridge & Cul. Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Michigan, Bay City
U. S. Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.

Montana, Missoula
Montana Culvert Co.
Nebraska, Lincoln
Lee-Arnett Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Cul. Co.
New York, Auburn
Pennsylvania Metal Cul. Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Wks.
Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Cul. Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.

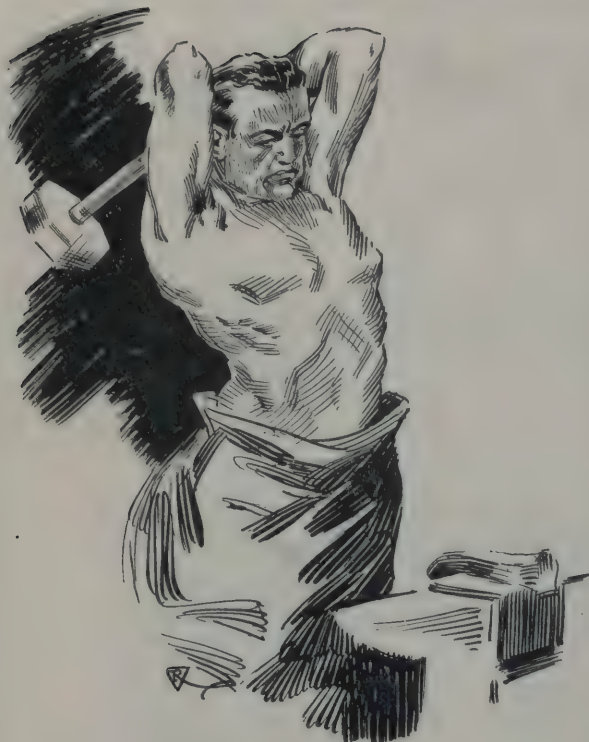
Oregon, Portland
Coast Culvert & Flume Co.
Pennsylvania, Warren
Pennsylvania Metal Cul. Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal Works
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Culvert & Flume Co.
Virginia, Roanoke
Virginia Metal Culvert Co.
Washington, Spokane
Spokane Cor. Cul. & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Cul. Co.



Resists Rust

Write or phone the nearest manufacturer for full information on Rust-Resisting "Armco" Iron Culverts, Signs, Gates, Roofing and Formed Products.

CANADA—Canada Ingot Iron Co., Ltd., Guelph, Sherbrooke, Winnipeg, Calgary



Strength

Reason 3 for

"COPPERWELD" TROLLEY WIRE

"Copperweld" trolley wire is so superior in tensile strength that pole spacing may be even greater than that made possible by difference of weight alone.

In these days when cities raise so much objection to the presence of poles and overhead wires it is a factor in good public relations to use a construction which will disfigure the streets as little as possible.

Furthermore, wire of such great tensile strength as "Copperweld" raises no question as to the safety of long spans.

"Copperweld" trolley wire admirably fulfills these public welfare conditions, aside from its superiority as a long-lived conductor.

General Sales Office
Page Steel and Wire Co.
30 Church St., New York

Western Sales Office
Steel Sales Corporation
Chicago, Illinois

Made from the product of the Copper Clad Steel Co., Pittsburgh, Pa.

Drawn and sold exclusively by

PAGE STEEL AND WIRE COMPANY

MONESSEN, PA.

ESTABLISHED 1883

SPEED with SAFETY



32½ Miles
in
59 Minutes
with
5 Stops

C-H-A-P-M-A-N Track Relay Signal System

shown here in operation on the "Chautauqua Route" of the Jamestown, Westfield and Northwestern Railroad, consists of a simple relay mounted in a box, and operated by a type ET, two-cell storage battery which is in the same box.

Two 60-ft. sections of rail are insulated about 300 ft. ahead of each signal—giving the motormen time to get the indications without slowing down. The line is used for 62 passenger trains a day in the summer season, in addition to baggage and express cars.

Charles N. Wood Co., 14 Federal St.,
Boston, Mass.

AUTOMATIC BLOCK SIGNALING *for* PROTECTING HIGH SPEED TRAFFIC

More interurban trains are operated out of Los Angeles than out of all nine of the most important interurban centers in the central West, combined. The Pacific Electric Railway handles all of the trains from Los Angeles.

The result to be obtained where "UNION" signals are used is indicated by the performance and cost records of the Pacific Electric Railway, as published in the December, 1917, Journal of the Railway Signal Association.

Results obtained on the Pasadena Short Line:

Average number of trains per day...	800
Average number of signal functions per day	16,800
Average number of relay functions per day	33,600
Total failures for the entire year of 1916.	20
(Ten of these failures due to lamps burning out)	

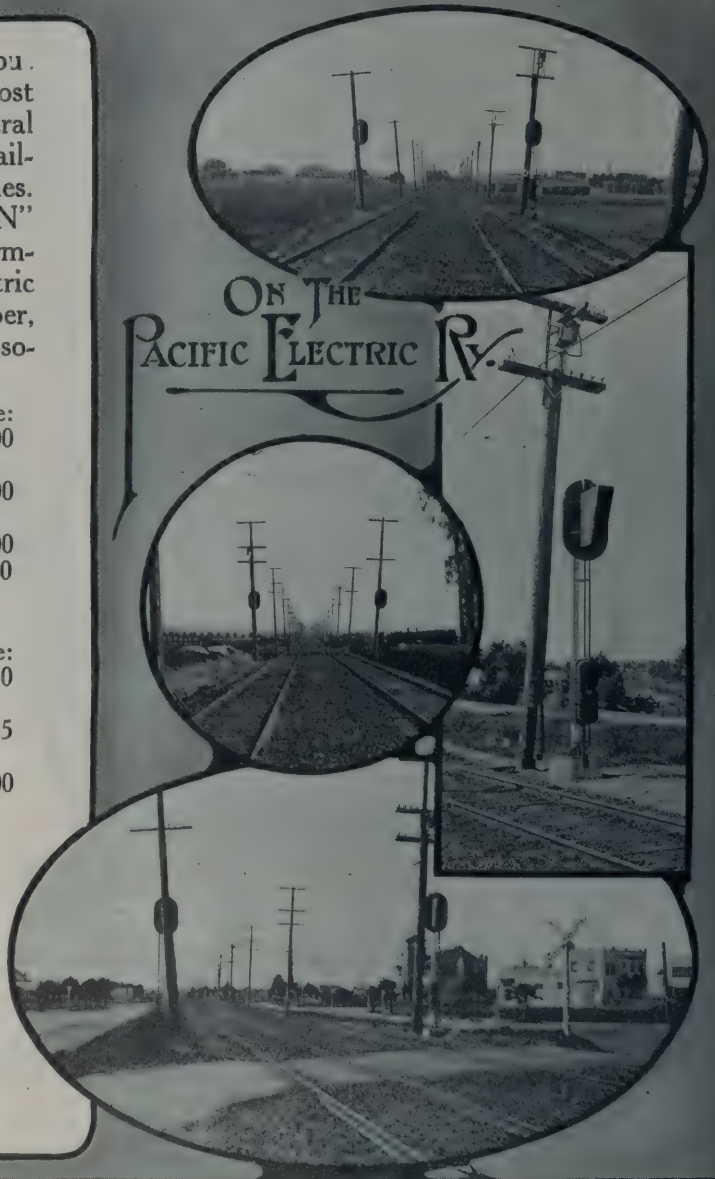
Results obtained on the Venice Short Line:

Average number of trains per day...	130
Average number of signal functions per day	5,655
Average number of relay functions per day	11,300
Total failures for the entire year of 1916	25
(Thirteen of these failures due to lamps burning out)	

Cost of maintenance and operation, including power, per signal, per year..... \$33.00

The signals, relays, bonds, transformers, etc., used in these installations are products of the Union Switch & Signal Company.

ON THE
PACIFIC ELECTRIC RY.



Union Switch & Signal Co.

SWISSVALE, PA.



Hudson Terminal Bldg.
NEW YORK

Canadian Express Bldg. Candler Annex
MONTREAL ATLANTA

Represented by the GENERAL ELECTRIC CO. in Australasia, South Africa and Argentina

Peoples Gas Bldg.
CHICAGO

Railway Exchange Bldg. So. Pacific Bldg.
ST. LOUIS MO. SAN FRANCISCO



Two-Track Service over a One-Track Trestle

To eliminate a grade crossing, the City of Portland, Oregon, raised the level of Sandy Boulevard, while the Oregon-Washington Railway and Navigation Company lowered its right-of-way.

In the meantime, the double track line of the Portland Railroad, Light & Power Company had to be shifted to a temporary trestle.

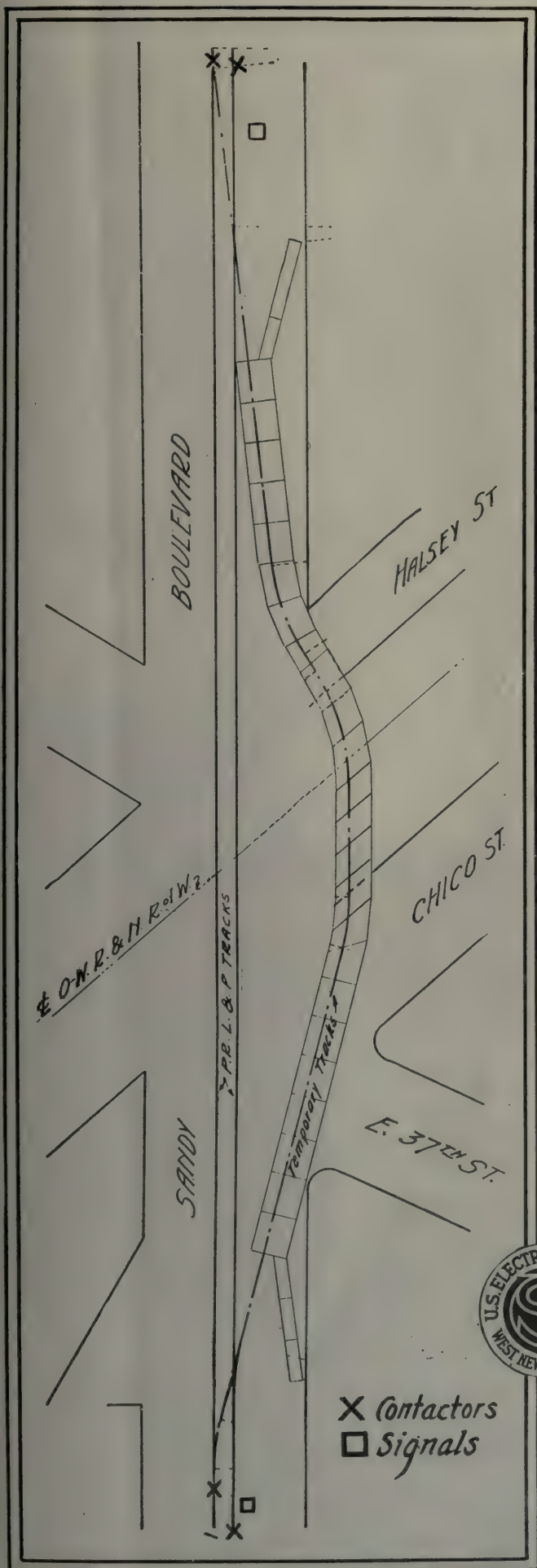
This trestle is so narrow that the tracks and trolley wires are gauntleted 7 in. centers, giving in effect a single track.

Note how readily safe operation over this temporary structure was secured by using four contactors and two U. S. Electric Signals.

"U.S." Electric Type G-1 Signals

insure the safety of all of your passengers all of the time.

United States Electric
Signal Company
West Newton, Mass.





Assume that this represents the power used by a careful motorman in operating a car on a given run—

And this the power used by a careless or incompetent man for the same run—

Excess
25%



Where Does the Excess Power Go?

Practically all of it has been taken out at the brake shoes!

Further: This power is not only a negative loss. It is a positive added expense for it represents not merely power wasted, but power put to a destructive use in the wearing away of brake shoes, wheels and tracks, and in the overloading of motors and equipment.

The Arthur Power-Saving Recorder

induces the motorman to avoid excessive use of brakes. If the effect of this were merely the saving it produces on brake shoes, wheels and equipment it would pay handsomely. But

it is obvious that it must also save power. Because if you take less power out of a car during a given run you certainly must have put less power in.

One effect is to encourage the motorman to coast more, but there are a lot of other advantages in the use of the Arthur Recorder that are mighty important.

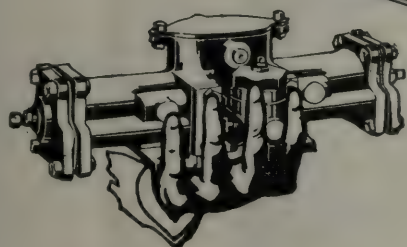


Showing recorder location on one of the 1200 cars of the Connecticut Company

The Arthur Power-Saving Recorder Co.

Second National Bank Building
New Haven, Conn.

"Power wasted is the true measure of the motormen's relative efficiency."



National Pneumatic Door and Step Control in Detroit Train Service

Satisfactory train operation over city streets is largely a matter of keeping the standing time per stop within reason—

And this can be accomplished only with pneumatically-operated doors which enable the conductors to give the go-ahead signal quicker than would be possible otherwise.

Hence the **National Pneumatic** equipments installed on center-entrance trailers by the Detroit United Railway have proved a most important factor in the successful train operation of that system.

NATIONAL PNEUMATIC COMPANY



50 Church St. New York

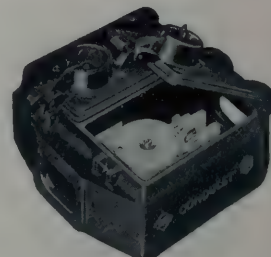
515 Laflin St. Chicago

ZY Series Safety First Switch Condulets

Fused Snap Switches in Cast-Iron Housings

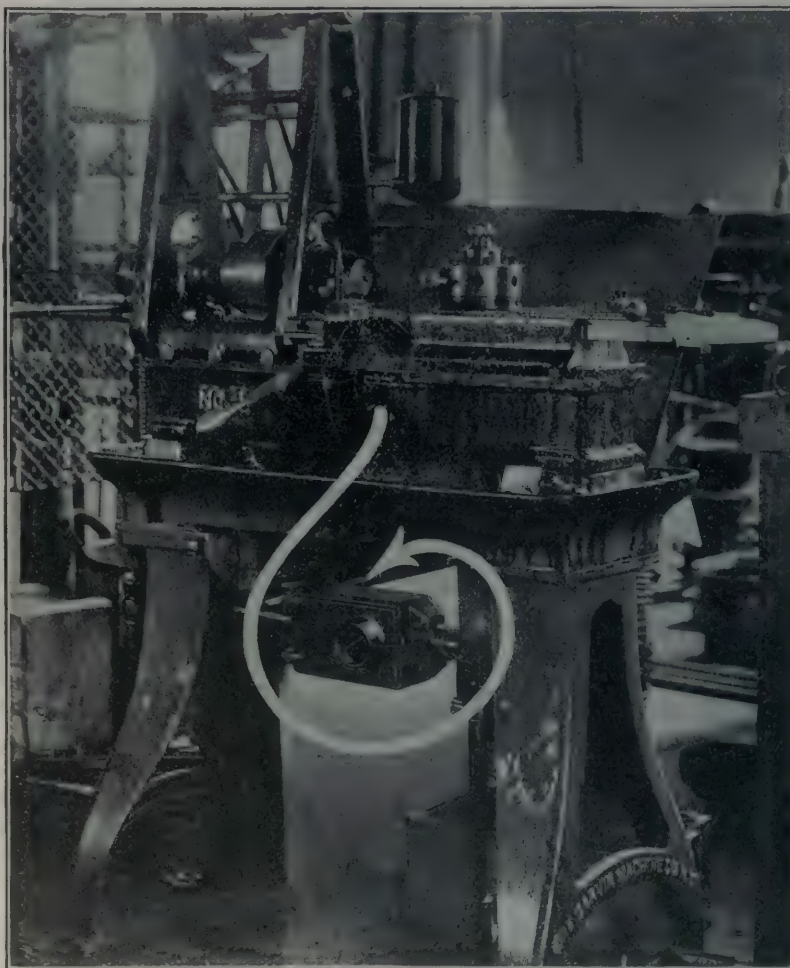
Designed for control of small motors, electric ranges, etc., where switch is operated and fuses are replaced by persons not thoroughly familiar with electrical devices. Door of housing cannot be opened until switch has been turned "off."

Interior mechanism and fuses absolutely protected from dust, lint and mechanical injury. Impossible to puncture or dent switch housing. Detachable hub plates make possible any form of conduit installation.



Type ZYU (2-gang)
without Hub Plates

☐ Complete Condulet Literature forwarded free on request.



An Actual Installation of ZYC Condulet

CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.



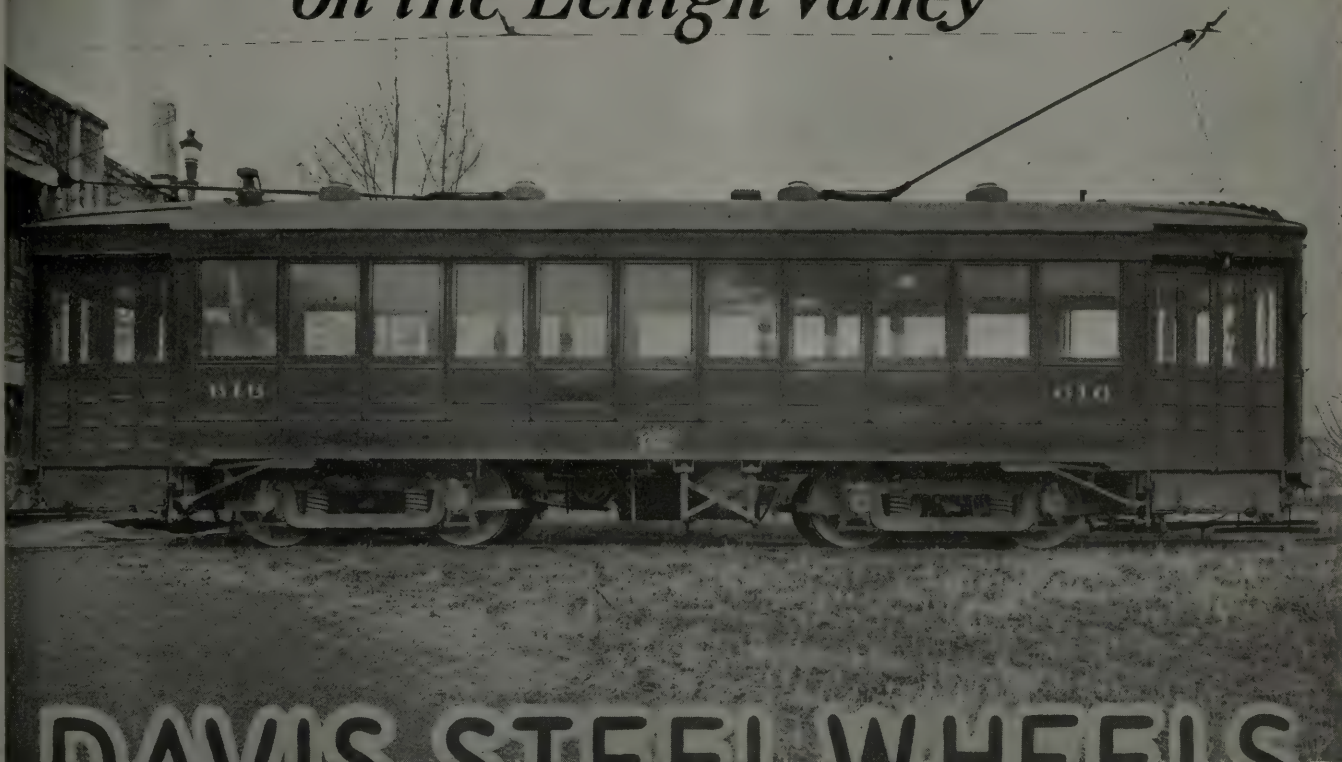
NEW YORK

BOSTON

CHICAGO



Hills-Heavy Grades and Sharp Curves on the Lehigh Valley



DAVIS STEEL WHEELS

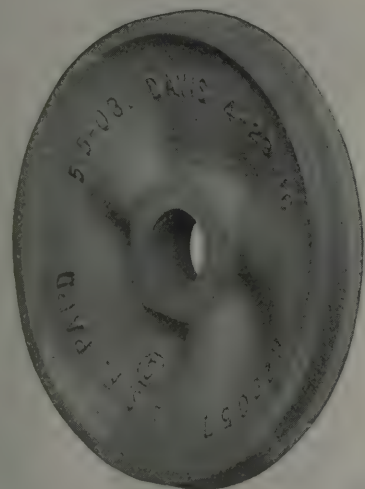
Out of Allentown and into Philadelphia are hills, hills and more hills.

The heavy grades and sharp curves exacted enormous tolls for wheel re-turning—to remove the flats and flange wear.

The Lehigh Valley Traction Co. has eliminated this expense and have increased their mileage capacity with the Davis One Wear Manganese Steel Wheel.

A Suggestion for your lines.

The Standard
for
Electric Railway Service



AMERICAN STEEL FOUNDRIES

1100 McCORMICK BUILDING

CHICAGO

V-K



OILLESS TROLLEY WHEEL AND NON-ARCING HARP

Waste is Treason.

Every conservation measure you adopt is a patriotic measure. Using V-K Trolley Equipment should be one of them. It reduces waste of current—time—labor. It leads to improved service, longer wheel mileage and minimum wear on overhead. Any fair trial will prove every one of these claims.

Write today for catalog and full particulars

MORE-JONES BRASS & METAL COMPANY
3134 NO. BROADWAY, ST. LOUIS, U. S. A.



A hundred years ago a little village was incorporated under the name of Cleveland, at the mouth of the Cuyahoga river. It then boasted of about 600 people.

Euclid Ave. near Giddings Ave.—1873

History Has Sidestepped Cleveland

except in so far as local events are concerned. Its growth was steady and rapid during the years following the Civil War, but nothing sensational occurred to draw the eyes of the world upon it, until its street car troubles started and Mayor Tom L. Johnson embarked on his famous municipal ownership program.

Between 1850-1860 the city's transportation facilities far exceeded the needs of the 40,000 people who called Cleveland their home town. When the Cuyahoga river was bridged, many Cleveland people established themselves in the then city of Ohio, on the west bank of the

river, that city being later incorporated within the city of Cleveland. Street railway service developed rapidly to meet the needs of the fast-growing community.

As in every other city, growing population and increasing length of haul brought the necessity for larger, sturdier cars and greater speed.

This in turn meant heavier weights and improved equipment and all the minute detail of improvement that goes to make up mechanical efficiency in modern cars and power plants.

Galena Oils *and* Galena Service

have had a big place in the national development of electric railway equipment and service. Not merely because they have provided lubricants of superior efficiency, but also because the very fact that these materials have yielded superior results has made it possible for the railways themselves to deliver a better service.

Galena-Signal Oil Co.
Franklin, Pa.

Here's the Point

where you want the Material Dumped. Not half of it over the track.

THE DIFFERENTIAL Electric Dumping Car

places its contents well away from the track, leaving a clear road for operation. Cars are built entirely of steel, and a small individual motor for each car enables an entire trainload to be dumped safely by a single unskilled laborer.

The body is very low and light and can be loaded while in tilted position, permitting easy shoveling and much saving in labor.

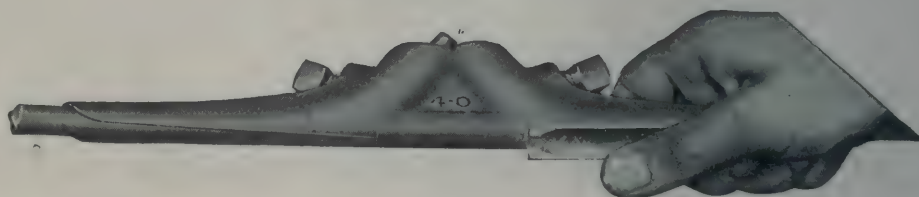
Invest in a train of Differential Electric Dumping Cars—and watch your construction expenses dwindle.



Write for Bulletin No. D3, and be convinced

DIFFERENTIAL CAR CO., INC., 141 Broadway, NEW YORK

A Good Splice and a Quick One— THE SAMSON



Note the smooth under-run. That's what every maintenance man appreciates. It's all due to the lugs cast on the inside of the lips—an exclusive patented Drew feature. When the wire is clinched, the notch made by the bend in the wire is completely filled. There can be no gap—no bump—no arc. That's one reason "Samsons cost less per car mile."

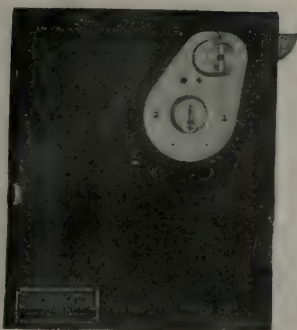
*On your next requisition specify Samsons
and get this benefit. Full details on request.*

DREW ELECTRIC & MFG. CO.

Offices and Works: Indianapolis, Ind.

Representatives in principal cities

*Drew Overhead Line Material Is Standard on Keenly Managed Roads
Get Quotations*



2 to 5 lb. of Coal for Every Kilo-Watt Hour at the Car

Millions upon millions of car miles are being run by more than 12,000 cars equipped with

Rico Coasting Recorders

Because of the use of the Coasting Recorder these cars have been propelled with ten to thirty per cent less CONSUMPTION OF COAL at the power plant than would have been possible otherwise.

Why not adopt this device? It has proved itself so thoroughly to back up Dr. Garfield's platform men's pledges, which in themselves are not self-checking and self-enforcing.

To Save Power COASTING is necessary

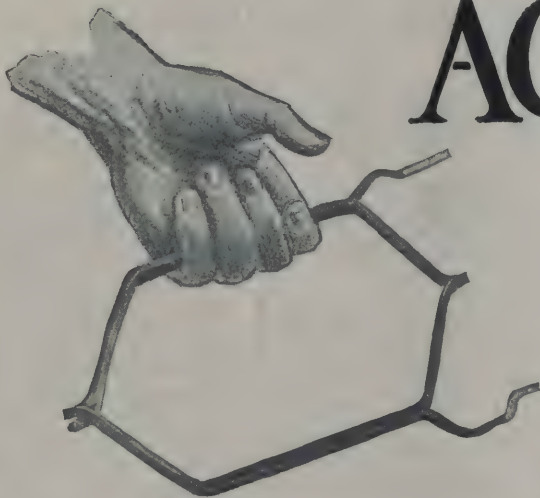
Give the motorman his coasting record and get the maximum savings.

Time is the Essence of Railroading

RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK



ACCURACY

Accuracy in form—
Accuracy in fit—
Accuracy in every point vital to their
operation.

G-E Armature Coils

will give the best service in G-E Motors.
Each item of material used in their make-
up is identical in quality with the original
coils in your motors.

A Good Motor
deserves
Good Coils]

General Electric Company

General Office



Schenectady, N. Y.

Sales Offices in all large Cities.

7529

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, February 2, 1918

Number 5

Experiences of British Managers Should Be Helpful to Americans

SEVERAL months ago the managers of two important English tramways were requested to contribute articles to this paper, giving information about the effect of the war on their management problems for the benefit of American electric railway managers. They kindly consented, and the first of these articles, that by J. M. McElroy, general manager, Birmingham Corporation Tramways, appeared on page 623 of the *ELECTRIC RAILWAY JOURNAL* for Oct. 6, 1917. The second article, written by T. B. Goodyer, manager of the Corporation Tramways of Croydon, which geographically is a part of London, appears in this issue. We are sure that the American readers, who are now facing almost identically the same problems of labor and material shortage as were encountered in Great Britain two or more years ago, will appreciate the value of the information contained in these experiences.

This Idea May Help Motormen to Save Coal

MENTAL assent on the part of motormen and others to the principle that coal ought to be saved will not bring results unless there is individual and strong conviction in regard to the matter. In these days it is easy for any man to realize what a shortage of coal there is in the line of domestic requirements, but it is not so easy for the same man, if running a car, to visualize the shrinking coal pile (if there still is a pile) at the power plant.

As he watches the long lines waiting for a dole of coal at the neighboring coal yard, or as he scrapes the floor of his own bin at home, he needs no prophet to tell him that coal is scarce, but somehow it is different on the front platform of a car. If, however, he tries to associate in his mind the power plant coal pile and the supply in his own cellar bin, possibly it will be easier for him to save coal in both places. In other words, he must learn in some way or other to think of car operation in terms of tons or pounds of coal.

Energy consumption in kilowatt-hours per car-mile, or per trip, furnishes a good basis for comparative purposes, but in the abstract a kilowatt-hour is about as nebulous in a motorman's mind as the n th power of x . However, in an editorial printed in the *ELECTRIC RAILWAY JOURNAL* for May 26, 1917, page 947, it was shown that a motorman controls the consumption of at least 1200 lb. of coal per day. A careless motorman may waste several hundred pounds in addition, particularly with coal of the poor quality now being sent out from the mines. In the average case, at least 10 per cent of this coal can be saved and in extreme cases two or three times this saving is possible. If we estimate that a

moderate-sized house can be heated on 100 lb. of coal per day it follows that a careless motorman may waste enough fuel to warm two or more such dwelling houses. By wasteful action he is, therefore, causing suffering, directly or indirectly, to a dozen people more or less.

Fuel saving must result from voluntary as well as forced co-operation. The motorman's co-operation can only be of the voluntary character, and it seems to us that this co-operation is assured if he can come to realize that by operating his cars carefully he is keeping a dozen of his fellow citizens from freezing.

Why a Fair Rate of Return Is Necessary Now

NEVER has the question of a fair return on electric railway investment been more vital than now. The public does not altogether understand this point. A common idea is that as the financing of all new projects has been discontinued largely on account of the war, so that the government may sell its bonds more easily, the electric railway companies would not be in the market for new capital at this time in any event. Hence, the question of what would constitute a fair rate of return and one which would attract the investor to public utility securities is of abstract interest only.

Now, it may be true that no great amount of capital can be spared at present for new public utility construction, but this constitutes no reason why the existing utilities should be kept in a condition of near bankruptcy. Even if the companies do not expect to make new capital issues now, justice demands that they should be allowed to earn a fair and reasonable rate of return on the investment in their property, used and useful in public service, and that this rate should be one that would attract new capital if new capital was available.

But this is not all. Good financial credit is necessary even now for many electric railways. Some have maturing obligations which must be refunded. Others are being asked by the government to make certain extensions. Still others must buy cars and other equipment if they are to continue to give good service. Electric railways have been officially recognized as "essential industries," so that it is just as necessary that electric railway extensions or improvements should be financed as that any other allied part of the program of national defense should be undertaken.

Finally, a fair rate of return should be granted now so that when the war is over and the security market is open to all, electric railways will be able to put themselves promptly in an efficient and effective condition. There is no valid reason, therefore, why the grant of a fair rate of return should be postponed.

Making It Easy to Buy Thrift Stamps

THRIFT stamps to the right, thrift stamps to the left—their places of sale are almost countless. This is one sales campaign, however, that cannot be overdone. Even if there are local institutions by the score where such stamps can be purchased, every additional method for keeping them to the front in the public mind is a marked gain. Unfortunately, electric railways, unlike electric lighting and gas companies, cannot easily reach the individual patron. He can be approached in interurban stations and city terminals, of course, but, as a rule, he must be handled in his car-riding capacity. But conductors are generally too busy. Who, then, can act as salesmen?

An interesting answer to this question is given by the United Railways of St. Louis, which for the first time in its history recently granted the privilege of selling on its cars.

The plan is that on certain days volunteer speakers should board the cars at main transfer points, make one-minute speeches, distribute order cards for signatures, and then take the next returning cars to the transfer points. This is a way in which many city railways could co-operate with local committees, older Boy Scouts, and similar organizations, in helping the government. Letter carriers could follow up the cards, as they will do under a direct mail-order plan which the government is now completing.

Under such a plan as that used in St. Louis, the railway does not figure directly in the sales talk, but it furnishes the buyers and the opportunity. With such a commodity that's most of the sales battle.

Support the Committee on Increased Revenue

IT IS to be hoped that the subscriptions to the American Electric Railway Association for defraying the expenses of the Committee on Electric Railway Revenue, of which Joseph K. Choate is chairman, will be sufficient to enable the committee to carry through its very important work. The financial demands upon electric railways within the last few months have been unusual, but nothing can excuse the failure of any company to contribute to the work of the revenue committee. Important as are the other activities of the association, there can be no doubt that this committee has before it the greatest problem which has ever confronted the industry. We are afraid that a few companies are inclined to take a short-sighted view of the matter. They are asking how the work of the committee will redound to their own particular advantage. They argue that the same amount of money could be spent with greater profit in individual work at home. Experience shows that this view is fallacious. The electric railways in New York State struggled for years to solve the fare problem, each working individually. It was not until they combined and worked through a general committee that any progress was made.

The work of the committee involves not only organized publicity as to what is being done throughout the country, but, what is of much greater importance, comprehends the permanent solution of the entire fare question. The electric railway industry has a chance

which will probably not be duplicated in the lifetime of this generation. The public is convinced, or can be convinced, that the industry needs larger revenues. This involves a revision of rates, and while this revision is being made, the opportunity is presented to solve the whole question permanently, by working out a system of fares which will be not only equitable to the rider, but will be sufficiently elastic to produce reasonable earnings for the company both in periods of rising and falling prices.

This constructive work is something which no single company can do. It must be done by a committee representing the entire industry. Prompt response on the part of the member companies will make it possible for the solution to be found in time to place the business upon a sound financial basis.

Traffic Reports in Digestible Quantities

CHAIRMAN BROWNLOW of the Public Utilities Commission for the District of Columbia used his newspaper experience in good stead when he suggested that John A. Beeler present his report on Washington traffic conditions in small, typewritten sections from time to time instead of waiting to deliver one ponderous tome from the printing press. This homeopathic plan has many advantages, such as:

Maximum publicity.—The effectiveness of the report will depend in large measure on how much of it gets to the public through the newspapers. It is easier to get 100 per cent publicity for each of a dozen weekly installments than 20 per cent publicity for the entire report.

Digestibility.—When the report is published in small units many readers will peruse each one from beginning to end instead of merely scanning the headlines.

Revelation of public opinion.—As each section is published, interested citizens will forward comments to the newspapers, thus giving the commission some inkling on how the recommendations appeal to the man in the car. The railways affected also have the opportunity to put themselves on record while the subject is fresh in the public mind.

Easier handling of objections.—It is easier to break one stick at a time than to dispose of a bundle of fagots. On the same principle, it is easier to deal with the few objections to each unit as they arise, whereas if all objections were presented at one time the commission would be in a quandary.

Timeliness aids acceptance.—By presenting the findings while the original data are still fresh the probability of their acceptance is far greater. For example, the Washington public is far more likely to favor certain plans while knee deep in winter than it would if the same suggestions were made in walk-inviting May!

One other literary feature of the Beeler unit reports may be mentioned. While accurate in technical expression, they are written and captioned in a way to appeal to the interest of layman and engineer alike. After all, as the commission and its consulting engineer wisely realize, the extent to which public service recommendations are put into practice depends upon how well the public itself appreciates their justness. Many a splendid traffic report of the past stands on a shelf, unwept, unhonored and unsung, because no one knew how to advertise it, and thereby sell it, to the people.

Essentials to Skip-Stop Success

A THOROUGH understanding by the public, the whole-hearted co-operation of the trainmen, and care as to the selection of the initial day of the trial installation, are among the more important aspects of the problem of introducing the highly desirable but for the most part unpopular skip-stop service. These three contingencies were particularly emphasized on a fairly large size Midwest property in a very recent experience with the skip-stop system, by the avalanche of criticism which was immediately manifested.

In the first place, it is difficult to bring the public to a full understanding that under the system the taking off of a few cars does not mean a reduction in the service or seats per hour, but rather that the result of the skip stop is a saving of ten or fifteen minutes in the time required to get home at night or down to work in the morning. The company in mind had talked to the public along this line, but there was still a general feeling, it afterward developed, that there had really been a great reduction in service. The principal cause of the complaints in this case, however, was a combination of antagonism on the part of the men and a very unfortunate weather condition with concurrent service interruptions and delays.

The experience of this company affords a good example of the importance of winning the trainmen over to the new scheme. Here they were nearly all opposed to the adoption of the skip-stop. And on the day selected for the initial installations the rails were extremely slippery. Also the progress of certain construction work suddenly made it imperative for the company to cut off service on a certain portion of one line in the downtown district, necessitating rerouting of cars and an abnormal congestion and retardation of service. After waiting considerable periods for cars, passengers would get on and ask the conductor the cause of the slow service. He naturally, because of his attitude, blamed it upon the installation of the skip stop, and thus this valuable economy was given a knockout blow, and most unjustly, at the very outset.

The rail conditions and emergency rerouting were excusable and unavoidable causes of slow service, but the skip stop received the full blame as the result of the unfortunate day and the trainmen's antagonism. Incidentally, the company learned also that on another installation, it would be better to reduce the number of cars gradually on succeeding days, thus leaving a surplus of cars on the line for the first day or so until the new system was working smoothly.

An interesting side light on this company's experience for the first month of skip-stop operation was the effect it had on the accident report. The claim departments have sometimes opposed vigorously the permanent skipping of certain streets as stops, as they held that this would tend to result in the cars crossing these streets at high speed, with consequent increase in the number of collisions.

The record for the first month in the case in mind, however, showed exactly an opposite tendency. The boarding and alighting accidents were reduced in number, as would be expected from the smaller number of stops. But the accidents with automobiles and other vehicles also, quite unexpectedly, showed a decided

downward tendency. If the reports for one or two succeeding months continue to show the same tendency, the information will be released for publication in this paper. The various accidents are carefully classified and analyzed so that the results are quite conclusive and may serve to dispose of the apprehension which some managements have for the skip-stop service.

Now Is the Time to Act on Higher Fare Requests

ADDRESSING the recent convention of the Investment Bankers' Association, Orlando B. Willcox of New York made use of some figures as to rate decisions which should furnish a basis for thought on the part of those having the welfare of the industry at heart. An abstract from Mr. Willcox's report was printed in the Nov. 17 issue of this paper. Making the point that certain of the public service commissions are recognizing the necessity for increased rates to public utilities, the committee, of which Mr. Willcox was acting chairman, reported that in 462 rate applications announced up to date for the year 1917, increases were allowed in 401 cases. This meant that relief of some sort was given in 86 per cent of the cases presented.

To this extent the owners of such securities should feel encouraged. It develops, however, that the 462 cases referred to included only sixteen applications of electric railways, whereas the petitions from telephone companies numbered 184, and from electric lighting companies there were 145 cases. The further point is brought out that increases were granted in 91 per cent of the telephone cases, and in 82 per cent of the electric light cases, while electric railways were successful in only 68 per cent of the applications. It is probable that a study of decisions for the whole of 1917 would show that considerably more electric railways had sought and obtained higher rates. There is ground for suspicion, however, that this class of utilities has not yet fully awakened to the possibilities of getting financial relief through the public service commissions.

Surely the condition of the average electric railway is not more fortunate than that of the other utilities. The handicap imposed by fixed rates is everywhere apparent, and the injustice of allowing this to continue in the face of advancing costs cannot be questioned. Is it possible that we have men in this industry who, realizing the unhealthy condition of their properties, think the situation is hopeless and are too timid to apply for help? Or have they become disheartened at the unsuccessful outcome of other appeals for relief and abandoned themselves to despair?

This is not the time for timidity. War conditions have imposed unusual burdens, but they also offer unexpected opportunity to get the benefits of a changing public opinion. The people realize now if they never did before that the cost of everything has gone up—everything except electric railway fares and a few other items. Members of the public utility commissions, keeping their hand on the public pulse, are likely to realize more quickly than ever before the fairness of applications for a departure from fixed rates. Holders of such securities, of whom the "common people" constitute a considerable part, must arouse themselves and send for the doctor before it is too late.



Your newspaper

Some of our passengers have asked us to suggest that a newspaper, if folded once or twice is easier to read; besides it adds to the comfort of your neighbors.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Falling on the Stairs

Nearly 200 persons fall on subway stairs every month.
Don't be careless.
Use the hand rails on the stairs.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Keeping Trains on Time

To maintain our schedule of one minute and 48 seconds between rush-hour trains, passengers should cooperate with guards and platform men all they can.

By getting on and off trains promptly they will do much to keep trains on time.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

All the Tracks will Hold

Nearly 1,500,000 persons ride on the Subway every day. Nearly half of this number are carried during the rush-hours—between 7 and 9 a. m. and 5 and 7 p. m.

We are running every rush-hour train the tracks and station facilities permit.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Our Supreme Purpose

We strive to provide for the safety and convenience of every passenger.

During rush hours subway express trains run only one minute and 48 seconds apart.

We are running every rush-hour train the tracks and station facilities permit.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Use the Locals

Local trains are generally less crowded during rush hours than express. Their running time is only a few minutes longer.


For passengers with a few extra minutes locals will prove more comfortable.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

A Little More Care

We can guard against accidents in train operation. Nothing but care on your part will prevent those accidents due to your not looking where you walk. That's why our Guards constantly warn you to watch your step. Please do.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.



On Monday, June 25th, ten per cent. of all ticket sales on the Subway and Elevated will go to the Red Cross War Fund.

INTERBOROUGH

Were You One?

Last month 306 persons "took chances" and lost. On Subway platforms 99 of these did not "watch their steps." 237 were struck by car-doors.

Carelessness causes accidents despite safety measures.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

ABOUT STAIRWAYS

May we suggest that you always use the right side of the Stairways. Failure of some people to do this, especially at Brooklyn Bridge and Grand Central, causes unnecessary confusion and delay. Please keep to the right.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

It's Up To You

We have spent \$1,250,000 on appliances in these Cars to secure your safety. Won't YOU help us by being careful?

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Caring For Your Safety

In ten years the Subway has carried one and a half times the world's population. Only ONE passenger has been killed during that time in a train accident.

This World Record of Railroad Safety is the result of constant vigilance.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Room in End Cars

Many passengers take the crowded cars that stop nearest the stairs.

Frequently—when center cars are full—there are vacant seats in front and rear cars.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Our Resolution

Our New Year's resolution is to continue to aid the Government in every possible way in the struggle for the only kind of peace that will make the world a better place in which to live.

Happy New Year!

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Getting On and Off

Passengers getting off have the right of way. Please do not attempt to board a car until the passengers leaving it have had a chance to get off. Much confusion can be avoided in this way.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Save Your Own Time

If you will move away from the door on entering a car, you will shorten the time of your trip. Standing near the door adds to congestion and delays your train.

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Our Duty—and Yours

To back up our 1260 Men in the Service of Uncle Sam we have subscribed \$4,000,000 in Liberty Bonds. Won't You, too, Buy a Liberty Bond?

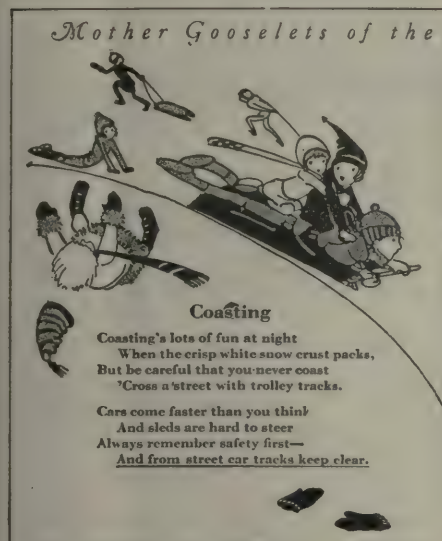
INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

For Your Sake and for Others

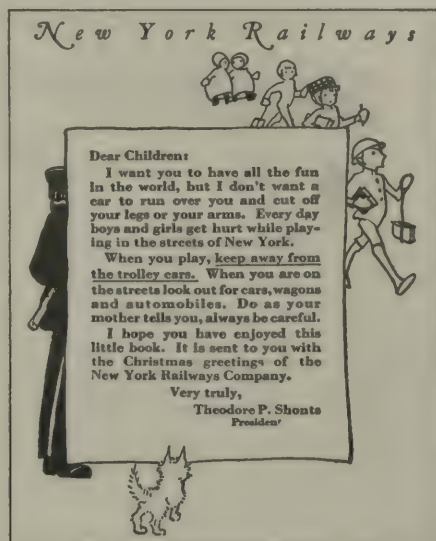
Please—
Do your Christmas shopping between 10 A. M. and 4 P. M.
You will thereby avoid the crowded rush hours.
Thank you!

INTERBOROUGH
Merdor P. Monte
President
Interborough Rapid Transit Co.

Here Are Eighteen of the Twenty-six Interborough Car Posters Which in 1917 Made the New York Public Think



Interborough Publicity Sets Public to Thinking

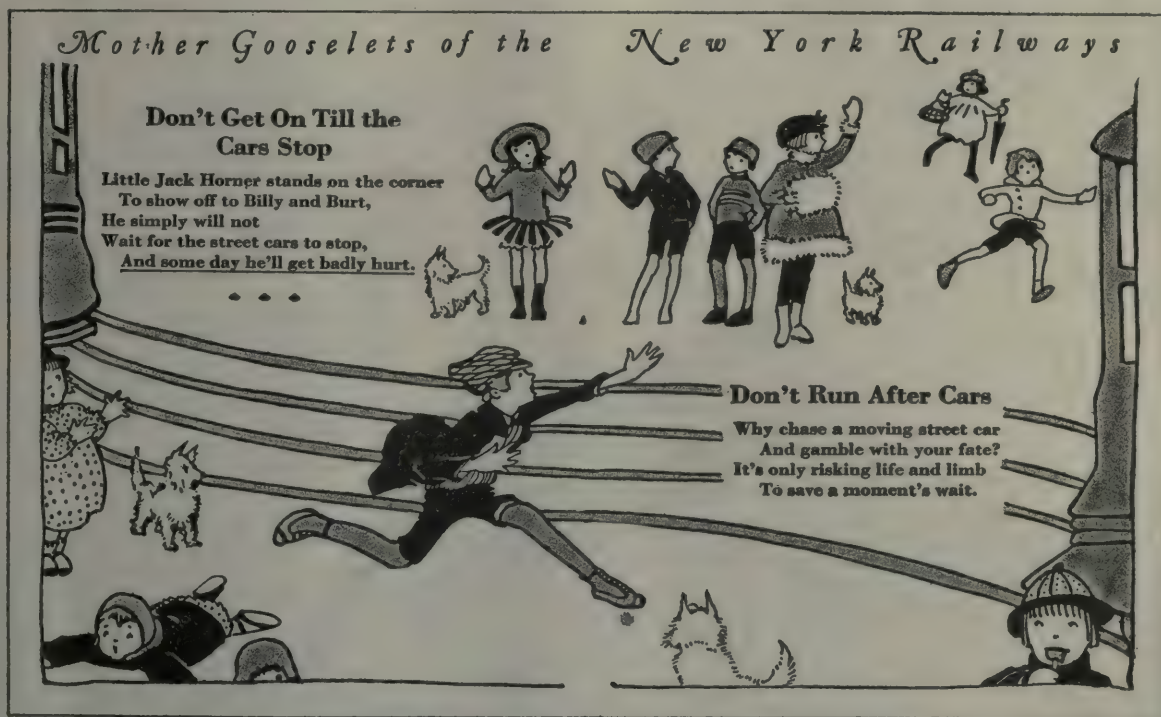


Result of Year's Work with Car Cards and Bulletins
on the Rapid Transit and Surface Railway Lines Is
Encouraging—Interest of Public Has Been Aroused

IT WAS just a year ago that the Interborough Rapid Transit Company, operating the subway and elevated lines in New York City, started its publicity campaign. In January the company placarded its cars with a poster asking the public for criticism. The company made a frank appeal for public assistance—the beginning of a definite campaign to secure an understanding of its problems by the public. The first few posters and the results of the complaint campaign were

portation. The cards used are reproduced in part with this article. Extensive as the campaign has been, it is really just starting.

It takes time to attract the public's interest. That the Interborough is making progress, its management is certain. These facts, in its opinion, so testify. In one musical comedy in New York the Interborough's cards are made the subject of a topical song. Every few days newspaper cartoonists work the cards into their



PAGES FROM BOOKLET OF SAFETY RHYMES, A CHRISTMAS GREETING TO NEW YORK CHILDREN

described in the issue of the ELECTRIC RAILWAY JOURNAL for April 7, 1917.

During the year twenty-six cards have been used. They have inspired thousands of letters to the management of the company, making it possible to develop a mailing list of people who are interested in local trans-

drawings. Newspapers make the cards the subject of editorial comment that has proved exceptionally helpful. Moreover, "letters to the editor" by the dozens have resulted. These agencies always treat of things about which the people are thinking.

People differ as to the way to approach the New York

Please

*look out
for the car on
the other track—
when walking
behind
this car*

Theodore P. Shouts,
President
New York Railway Company

Courtesy

We instruct our employees to treat passengers as they themselves would like to be treated. Won't you put yourself in their place and treat them accordingly?

Theodore P. Shouts,
President
New York Railway Company

PASSENGERS' COMFORT

Passengers sitting with legs crossed or feet extended into the aisle frequently cause annoyance to those who are standing in or moving through the car.

Theodore P. Shouts,
President
New York Railway Company

Standing Between Cars is Dangerous

NEVER Try It Between Stepless Cars
They are wider than old-type platform cars

Theodore P. Shouts,
President
New York Railway Company

Safety Zones

DON'T TAKE CHANCES!

Stand Inside—
They protect you from reckless drivers while you wait for the car.

Theodore P. Shouts,
President
New York Railway Company

Walking Blindfolded

DON'T TAKE CHANCES!

Look—
to see what's coming before you step from behind a street car.

Theodore P. Shouts,
President
New York Railway Company

WON'T YOU HELP?

The safety of passengers is our first thought always. When accidents do happen, we take steps to avoid similar ones. When you see an accident, won't you help us by giving the guard your name, so we can learn the facts?

Theodore P. Shouts,
President
New York Railway Company

"Over There"

Our Service Flag has 1260 stars. That many Employees of our Companies are now in active service under the Colors of Uncle Sam.

Theodore P. Shouts,
President
New York Railway Company

Patriotism

We are proud of our employees. 3,455 of the men working for this company voluntarily put their own savings into Liberty Loan Bonds. They are doing their part by their Country as well as by the public they are trying to serve.

Theodore P. Shouts,
President
New York Railway Company

The Surface Line or New York Railways' Posters Also
Had Messages Written to Awaken and
Hold Public Interest

HOW FACTS WERE PUT ACROSS IN SPECIAL RAPID TRANSIT BULLETINS

As a Christmas greeting to the children of New York, Mr. Shonts issued an illustrated booklet of safety rhymes. This was published by the New York Railways and distributed to children throughout the city. The main characteristic of the book is the action portrayed in the illustrations. Another feature is a note ad-

EXPLAINING TO THE PUBLIC MATTERS OF SURFACE OPERATION

Meeting War Burdens in Croydon

Employment of Women Conductors Must Be Regarded as Success—Higher Costs of Operation Have Overbalanced Receipts—Companies Are Entitled to Demand Fare Increases to Maintain Service and Financial Stability

By T. B. GOODYER

Manager Croydon (England) Corporation Tramways

MORE than three years of war finds the Croydon Corporation Tramways, in the London suburban area, operated, like the majority of systems in Great Britain, under conditions which a few years ago would have been considered impossible. The fact that the country was unprepared for the gigantic struggle now in progress eased to some extent the difficulty with regard to labor. To set up the vast machinery now in operation for the successful prosecution of the war took time, and in that fact many employers benefited. The drain on labor was gradual, allowing new provisions to be made from time to time to meet the altered conditions. Whatever the result may have been from the military aspect, there is no doubt that the adherence to the voluntary system of recruiting for some considerable time following the outbreak of the war tended to render less difficult the task of tramway managers in Great Britain.

Tramway employees have responded to the call of their country and civilization as readily as any section of workers. Following the declaration of war a considerable number of men were withdrawn from the tramway industry by the calling up of the army and navy reserve. The loss of these men in Croydon had

the effect of eliminating the margin of reserve men rendered essential by reason of the fluctuation in the service operated on five days of the week, and on Saturdays and Sundays.

For a time the loss of men was confined to the section mentioned, but as the magnitude of the task was gradually realized, men from all grades began to answer the call for volunteers. Then arose the proposition of maintaining the car services with a seriously depleted staff. Considerable help was rendered by the employees foregoing their "rest days," but before long the constant drain made it necessary to increase the hours of duty. As the system of payment at Croydon is on the hourly basis, no adjustment in respect to wages was necessary, the employees automatically benefiting financially by the altered conditions.

After pressure had been brought to bear by the management of various systems, the commissioner of police for the metropolitan area finally agreed to license women to act as conductors. There is no doubt that certain men held very strong views concerning the advent of women in this class of employment. Although the practice of employing women in this capacity had been in vogue for some time in the provinces, the innovation in the London area caused dissatisfaction among the union men. Eventually, however, they waived their objections when the women were offered the same terms as the men whose places they were to fill temporarily.

A small number of women conductors were engaged in Croydon at the beginning of 1916. The ill-feeling referred to above was probably the principal factor in connection with the strike of employees which occurred, firstly, in a neighboring company system, and secondly, on the Croydon undertaking in April, 1916. The Town Council offered to look into the men's grievances if they would return to work, but the men were obdurate. With the exception of a few of them who realized the mistake they had made and returned to work, a large number of strikers did not again take up service with the corporation.

The sudden withdrawal of 70 per cent of the motormen and conductors threatened to shut down the undertaking, but the men had little or no sympathy from the general public. Yet the management had to tackle what seemed an impossible task, that of providing a service to meet the convenience of a town of 180,000 inhabitants with but a mere handful of men.

Notwithstanding the labor shortage, the problem of resuming a normal service was solved in eight weeks. Inspectors and regulators were temporarily removed from their ordinary duties and placed as motormen. The conductors who had remained at work were trained and put on as motormen. Members of the official and depot staffs drove cars after the completion of their daily duties and also on Sundays. Several members

(Concluded from page 219)

dressed to the children and signed by Mr. Shonts. It is printed on the inside of the cover of the booklet.

Series of bulletins are being issued by the companies from time to time. Their effectiveness lies both in their typographical appearance and in the presentation of the material in a "different" way. Not long ago the Interborough published a bulletin on some traffic facts that were developed in a few hours spent with the trainmaster of the subway early one morning. There was nothing new about the material, but nearly every newspaper in New York published leading news articles based on the pamphlet. Copies of this were sent to 25,000 people in New York, a selected list.

An important step in the Interborough's publicity work during the year was the publication of a pamphlet on the completion of the third-tracking of the elevated railroad.

Another bulletin told of the patriotic work of the Interborough and its men. The company's and its employees' Liberty Bond subscriptions, the number of men in the military and naval service, the help given to the Red Cross—all were shown. The story was told mostly with illustrations. Just the bare facts were given in words. This, however, is typical of all the publicity work the Interborough is doing. It does not characterize its own actions. It states the facts and lets the public draw its own conclusions.

of the Town Council and other volunteers—one a magistrate—even took out licenses and thus assisted the management to meet the public convenience.

New applicants as motormen were gradually obtained, and the conductors' places were almost entirely filled by women. It therefore soon became possible for the inspectors and regulators to resume their ordinary duties. Except for a few days at the commencement of the strike, the local public suffered but little inconvenience.

WOMEN CONDUCTORS HAVE MADE GOOD

The employment of women as conductors must be regarded generally as a success, especially in consideration of the abnormal conditions under which they are working. The actual work of fare collection per conductor has considerably increased owing to the heavier loading of the cars. This has been brought about principally by the large number of women riders who have entered the industrial world to help make up for the shortage of man power.

The street lighting restrictions in the metropolitan area and in many provincial cities and towns have been very severe, and although there has now been a welcome withdrawal of certain conditions, for a long time the cars had to be operated in semi-darkness. This obviously was very trying to the women conductors new to the work, especially in regard to the correct punching of tickets and change-giving, and also at rush hours during the evening. Although the physical strain has proved too great in some cases, the women have in general been able to withstand the arduous duties and conditions much better than was at first anticipated.

While the women conductors accepted service on the same conditions as male employees of that grade, it has been necessary to grant certain minor concessions, including the provision of seats on the platform and the collection of top-deck passengers' fares on the platform upon boarding.

It has not yet become necessary at Croydon to use women as drivers, although the experiment is reported as being successful on a few systems in the country. Obviously local conditions will to a large degree govern the result of such a departure. In Croydon the narrow thoroughfares, together with the heavy vehicular congestion, will militate against the success of women drivers. Another important factor is the car equipment. Difficulty would undoubtedly be experienced at the present time in obtaining the necessary additional braking gear to render the cars more safe under the less experienced operation by women drivers.

FIFTY-FOUR PER CENT OF MEN WITH COLORS— EQUIPMENT DIFFICULTIES

Thus far 211 Croydon employees, representing 54 per cent of the pre-war staff, are serving with the colors. Their positions are guaranteed on return to civil life, and allowances are made to them or their dependents on such a scale that they suffer no financial loss by enlistment. Practically the whole of the fit men of military age are serving with the colors, only a few men of military age and in the lower medical categories holding temporary exemption from military service.

Of almost as great importance as the labor shortage is the difficulty experienced with regard to stores and materials. Many are the minor devices resorted to in the mechanical line to keep things going, without sacri-

ficing safety. While this may prove in the long run to be detrimental to the equipment, there is unfortunately no alternative when new material is not available and the services have to be maintained, especially for the sake of the large number of munition workers traveling to and from work.

Like the majority of systems in Great Britain, Croydon has experienced a marked increase in revenue compared with pre-war figures. No doubt a large portion of the additional traffic arises from the "out-of-doors" habit cultivated in the men by military training. This in the course of time affects their families. In both the national and tramway interests it is to be hoped that this habit may remain upon the conclusion of the war.

Against the increased income, however, has to be set the large advance in working expenses arising from increased wages, war bonuses, war service allowances, and the higher costs of stores and materials. These items became so serious in Croydon in August, 1916, that it was necessary to increase the fares to preserve the financial stability of the undertaking. Previously the Croydon fares had been among the cheapest in the country. Hence a somewhat extensive revision was possible, while at the same time keeping the revised charges below the general average for the country.

The first year's results of the revision have been satisfactory. It was estimated that an 8 per cent advance in revenue would be sufficient to cover the increased cost of operation and provide the necessary contribution to the reserve and renewals fund. This figure has been exceeded by a fairly useful margin. On the other hand, the operating expenses still continue to mount, and it is impossible to say to what level they may ultimately rise.

THE PUBLIC MUST PROVIDE ADEQUATE REVENUES

Many tramway systems in Great Britain—both municipal and private—have been compelled to revise their scale of fares in order to meet the greatly increased cost of operation. I have observed that the question of increasing fares on many of the electric railway systems in the United States has been engaging the most careful attention of operators over a long period. The matter has, in my view, long passed the doubting stage. It has become an acknowledged fact that if good service and increased wages are to be provided, together with money to meet the higher cost for all materials required in maintenance, the revenue must come from the only source possible—namely, the public. It is a practice which is now being followed in almost every other kind of business, but I fear we, in the tramway world, have all been somewhat late in putting it into effect.

While fare revision is bound to be unpopular with the traveling public, the interests of the ratepayers generally, where municipal undertakings are concerned, are best served by the maintenance of the financial stability of the concerns. The shareholders in privately owned companies have the right to expect, and are entitled to demand, similar consideration, even at the expense of a policy that may be unpopular for the time being. The abnormal period through which we are passing has compelled us to become reconciled to various changes, many of which are far more important than increases in tramway fares.

Present Situation Will Prove Blessing

Utility Service Better Appreciated—Relief Heretofore Deemed Remote Can Now Be Secured—Freight Handling and Distance Charges Advisable

BY HENRY L. DOHERTY

President Henry L. Doherty & Company, New York, N. Y.

IN these days of soaring prices for raw materials it is not a comfortable thing to be unable to fix your own selling price, but be forced to wait until a state commission or a municipal body is made to see the necessity for an increased price. When the railroad situation became desperately serious, ways were found to take care of it. Ways will be found to take care of the situation that now faces many of the public utilities. It will not require the drastic action which was necessary in the case of the railroads, for there are many methods whereby relief may be secured.

I think the present situation will in the end prove the greatest blessing to the public utilities of anything that has ever happened. The public established its right to have public utility charges reduced if they were unfairly high, and they must now be good sports and consent to have them increased if they are unfairly low. The people are already getting an appreciation of what public service means as never before. They realize that they are dependent upon these companies for the necessities and comforts of life, and no longer regard them as mere profit takers, and for many a year after this war is over the people will have a truer appreciation of what these companies do for them. Reforms can be secured under these conditions that have heretofore seemed very remote.

FREIGHT HANDLING SHOULD BE TAKEN UP

Street railway problems cannot be so easily and quickly corrected as those of the gas and electric companies. The electric companies have already developed a large power business, and the gas companies are now developing a large use of gas for industrial purposes. A similar opportunity exists for the street railways in the handling of freight, and yet practically nothing of any moment has yet been done by any of the street railway companies in handling freight, and it will require some time for the working out of suitable equipment and methods.

A few years ago it would have been idle to have asked most cities for the right to handle freight, and yet today it is only a lack of appreciation of what the railways might do for the city that prevents numerous cities from demanding that the street railway companies should handle freight. Our traffic problems are becoming so serious in the different cities in all parts of the United States that the quickest, and certainly the most economical, means of practical relief is to premiumize the street railway companies in the handling of freight.

It is axiomatic that freight can be moved more cheaply on steel rails and steel tires than with horse-drawn vehicles with steel tires on brick pavements, or motor-driven trucks with rubber tires on brick pavements. A street railway freight car moving on steel rails will make less noise, do less damage to the street, and interfere far less with other traffic, and in the majority of cases these cars could carry as much as ten wagonloads at a time. Sooner or later our electric railways are

bound to become the principal freight carriers in our cities.

I would like nothing better as a sporting bet than to take the street railways of New York City as handlers of freight and guarantee to do more to relieve the traffic conditions of the city than could be done by the expenditure of \$100,000,000 to relieve traffic conditions by other methods.

RATIONAL FARES BASED ON DISTANCE

Sooner or later the railway companies will also come to the matter of rational methods of charging. It is absurd to charge the same to carry a passenger ten blocks or 10 miles. Charges should be based on distance. The difficulties of establishing a distance system of charging are largely imaginary. It is remarkable how much intolerance there is to the mere suggestion of charging by distance, but it is largely due to the absurd and irrational zone systems that have been used. With a rational distance system of charging, both the public and the railway companies will be immensely benefited. Instead of causing congestion, it should tend to have an exactly opposite effect. I know of no man of skill in railway operation and management who condemns distance charging if he has given it serious and intelligent thought.

In one of our railway situations the Polish workmen in one of the factories ride to the extreme opposite corner of the city so they can live in a Polish settlement. Distance charging would be an inducement for them to find homes near the factory in which they work. Another of our railway properties operates through a suburban territory much of which is devoted to factories, and one terminal is in the heart of a congested city. The workmen in these factories largely reside in the congested city rather than in the beautiful suburbs which are close to the factories in which they work. Charging for transportation by distance will not tend to bring about congestion, but will contribute to more healthful and better living conditions.

The stockholders of railroad companies were punished for years by antagonistic regulation and legislation, but the public is now paying and suffering for this folly. Like treatment of the public utilities will inevitably bring like suffering to the people.

It is too bad that it requires such an awful crisis as this to make some men think, but this entire war situation will not be entirely without its blessings. The public, for its own good, should demand prompt and fair treatment for the public utilities. Unless they are given a fair margin of profit their credit will be crippled, and the public will pay the freight in the end.

I am more than satisfied with my public utility investments, and view the future with the greatest optimism.

One Hundred Years of Engineering

The Institution of Civil Engineers of London, England, on Jan. 2 completed the hundredth year of its existence, having been established in 1818 at a meeting of eight engineers at the Kendal Coffee House in Fleet Street. At the meeting of the institution on Jan. 8 a statement commemorative of the founding of the institution was presented, war-time conditions precluding more formal celebration of the centenary.

Relieving the Most Congested Point in the National Capital

First Section of Beeler Report on Washington Recommends 50 per Cent Cut in Stopping Places, Double Berthing, Front-End Fare Collectors, One-Way Traffic Streets and Other Means

THE first section of the report by John A. Beeler to the Public Utilities Commission of the District of Columbia on the steps necessary to afford immediate relief to the existing congestion on the lines in Washington, D. C., was made public in that city on Jan. 27. This section is devoted to the congestion in "the throat" of the Capital Traction Company system in Fifteenth Street, between Pennsylvania and New York Avenues, which the report considers the greatest in the city. Conditions must be improved there before any marked improvement elsewhere on the local traction system is possible.

CITY DID NOT GROW AS PLANNED

Unlike most cities, Washington was laid out by its founders according to a definite plan, but the principal development has been toward the northwest and latterly

The maximum condition of choking occurs on Fifteenth Street, between Pennsylvania and New York Avenues, where the cross currents of street car traffic converge from eight different lines and where 211 cars are scheduled to pass during 4.30 and 5.30 p. m.

Observations taken on Jan. 6, 1918, show that, even on Sunday afternoon when the most favorable conditions prevail, the average speed of cars near this point was only 6.86 m.p.h. This was for a distance of 2300 ft. On a week day in the middle of the afternoon the average speed of outbound cars was 6.12 m.p.h., while during the evening load on Jan. 11 from 4.30 to 5.30 the outbound speed averaged but 4.12 m.p.h. The lowest rate that was recorded occurred during 5.45 to 6 p. m., when the average speed was but 2.99 m.p.h. The traffic affected comprises two-thirds of that of the Capital Traction Company. The spacing also varied.

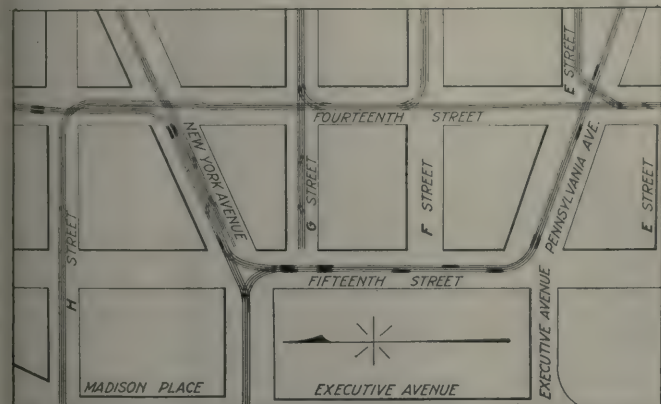
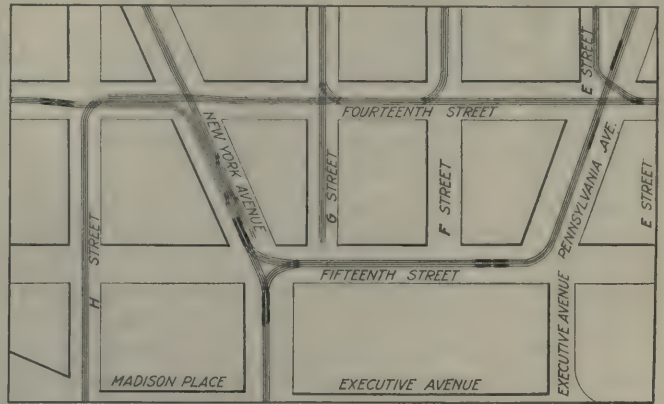


FIG. 1—THE BLACK SPOTS SHOW THE PRESENT STOPS FOR CARS IN THE CONGESTED THROAT OF TRAFFIC IN WASHINGTON.
FIG. 2—HOW THESE STOPS CAN BE CUT TO HALF AS MANY



also toward the northeast. The Police Census of Nov. 1, 1917, showed a population of 395,947. There has been a large influx of people within the last year on account of the war.

The city is served by two traction systems, the Washington Railway & Electric Company system with 118.8 miles of track, and the Capital Traction Company with 52.5 miles. On the regular routes 271 all-day cars are scheduled to operate, with 304 added during the period of maximum load, making a total of 575. Of these, the Capital Traction Company operates 38.5 per cent, and the Washington Railway & Electric Company 61.5 per cent. The worst conditions are met while people are going to and from their work. In some cities this series is called the "rush hour," but the report suggests that in Washington it would be a misnomer, as the cars do anything but rush. A better name would be "the crush hour."

Ten measures for immediate relief were recommended as follows:

1. The stopping places should be reduced to one-half. At present a northbound car has six and a southbound car eight regular stopping places between these points, which are but 2300 ft. apart. Fig. 1 shows the present stops and Fig. 2 the proposed stops. This reduction will not only permit freer movement of the cars through the throat, but will also do away with the stops at certain danger points, such as on New York Avenue before the turn is made into Fourteenth Street, northbound.

2. Double berthing must be employed at all the stops included within this congested district. The first car to approach a stop should always take the forward position. When a second car arrives while the first is still standing, it should take the second berth, and when it goes forward after taking on and discharging passen-

gers, it must proceed without stopping at the forward berth.

3. Safety zones, amply protected by traffic stanchions, should be placed at each of the proposed stops, the length of zone being sufficient for loading two cars simultaneously. These platforms should be about 10 in. high and 6 ft. wide, and they will protect the public more effectively from street traffic than any other practical arrangement. For the present these platforms can be constructed of wood, but more permanent construction can be substituted if desired later. Wooden platforms are, however, less slippery in wet or icy weather.

4. Front-end fare collectors should be stationed on each of the principal loading platforms during peaks of heavy traffic. These men should sell tickets, collect fares and issue transfers. If properly carried out, the use of front-end collectors results in more even loading of the cars and reduces the time lost at stops.

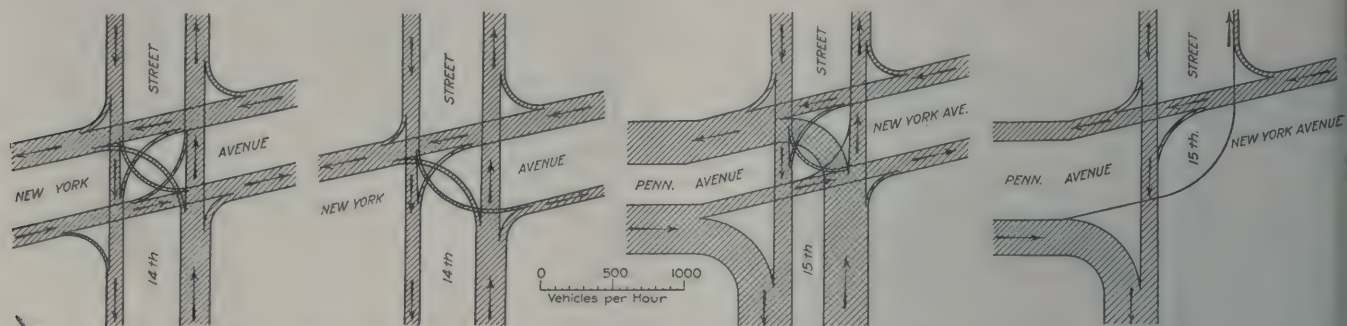
5. Street cars must be given preference by traffic officers. In other words, on the approach of a street car, the traffic officer must so regulate the other traffic as to permit the car to proceed at once to its proper stopping place unless the berth it should occupy is blocked by another car, or some other emergency pre-

8. Through routing of Chevy Chase cars. Certain changes are suggested.

9. The schedules should be changed so that cars will not be bunched when running on time, so that more uniform spacing of cars will be secured.

10. Introduction of the skip stop. The report says: "A general readjustment of the stopping points all along these lines should follow at once. An average spacing of not less than 660 ft. (eight stops to the mile) should be employed. Wherever safety stops are necessary, they should be combined, as far as possible, with passenger stops. Passengers will thus be afforded quicker service without any increase in the present free-running speed of the cars. There is no reason why a saving of from 15 per cent to 20 per cent of the time now consumed for a trip cannot be made by this means. A certain number of cars that are now running will be able to provide an increase in carrying capacity, because the cars can return more quickly for another trip."

In commenting on the advantage of diverting automobile traffic, the report says: "Each street car, when loaded, holds from eighty to 100 people, while the private automobile crossing its path usually carries but



FIGS. 3 AND 4—PRESENT RUSH-HOUR VEHICULAR MOVEMENT AND PROPOSED SIMPLIFIED PLAN, FOURTEENTH STREET AND NEW YORK AVENUE. FIGS. 5 AND 6—SAME FOR FIFTEENTH STREET AND NEW YORK AVENUE

vents. Traffic officers should endeavor always to keep the near-side berths empty and the far-side berths filled by passing two or more cars on one indication of the traffic sign. As the use of the conduit system makes it necessary for cars to coast over intersecting tracks or other special work, cars in pairs cannot proceed so close to each other as would otherwise be permissible.

6. Limited parking of automobiles. Between 8 a. m. and 10 a. m. and between 3.30 p. m. and 6.30 p. m. automobiles should be allowed to stop only long enough to take on and discharge passengers on Fourteenth Street, between H Street and New York Avenue, and on New York Avenue, between Fourteenth and Fifteenth Streets. At other times a slightly longer stop may be allowed, but never more than fifteen minutes. Other limitations on parking cars are recommended.

7. Certain streets should be devoted to one-way traffic. The graphs, Figs. 3 and 5, show the results of a vehicular count at Fourteenth Street and New York Avenue, Fifteenth Street and New York Avenue and Fifteenth and G Streets. If northbound vehicular traffic should be cut off on Fifteenth Street, between G Street and New York Avenue, and eastbound traffic on New York Avenue, between Fifteenth and Fourteenth Streets, there would be a minimum of interference to the cross currents of both street car and automobile traffic, as shown in Figs. 4 and 6.

two or three. By holding up the street cars for other vehicles, the many are delayed for the benefit of the few. The owners of automobiles should be the first to recognize this fact, and will no doubt be ready to contribute toward relieving the congestion of the streets, especially as many of them can do so with only slight changes of route and without loss of time. They should remember that street cars are confined to tracks and are obliged to have definite routes and stopping places, whereas automobiles are easily diverted and are elastic in their movements." It then suggests that vehicles from the east desiring to go north or west of the Treasury can do so best by means of Thirteenth Street, which is free of car tracks, or by the use of Executive Avenue, as it avoids all street car junctions, stopping places and traffic officers.

The next section of Mr. Beeler's report will deal with the staggering of working hours in Washington, relief to the Washington Railway & Electric Company's tracks, etc.

The Nashville Railway & Light Company, Nashville, Tenn., which for some time has been buying coal in car lots and supplying its employees at cost, is now hauling wood into the city from Glendale Park and distributing it among the employees for fuel.

Rate of 2.5 Cents a Mile Granted

Indiana Commission Decides that This Is Justified by the Emergency Confronting the Indianapolis & Cincinnati Traction Company

THE Indiana Public Service Commission has just handed down a decision of importance to interurban lines in that State. As announced in a preliminary note last week, it has allowed the Indianapolis & Cincinnati Traction Company to increase its rate per mile from 2 to 2½ cents. Although the commission cautions the interurban carriers of the State that every fare case must depend upon its own merits, the decision recognizes the principle that interurban lines can, for just cause, be freed from the restrictions of the Indiana 2-cent fare law.

COMMISSION CAN RAISE RATE

The commission first interpreted the State utility law as to power to increase interurban rates. It was decided that the Legislature intended to, and did, grant to the commission the power, in case of emergency, in order to prevent injury to the business or interests of any interurban railway of the State, temporarily to alter or amend any existing rates of such interurban line.

MORE REVENUE IS NEEDED

After an analysis of all of the evidence as to the increase in the costs of operation of the company's lines due to abnormal conditions, the commission was of the opinion that, conservatively estimated, the general increase in the cost of operation in 1918 would be from 20 to 25 per cent over the cost of operation for 1917.

The company has suffered a deficit for three years. Not only has it paid no returns on its common and preferred stock, but after the payment of only operating expenses, taxes, interest on bonded debt, floating debt and fixed charges, there were the following deficits: 1915, \$17,425; 1916, \$23,547; 1917, \$9,975.

If the company has, in 1918, gross earnings equal to those in 1917, which in this respect was the best year in its history, and if 20 per cent for operating expenses is added to the operating expenses of 1917, the company will, in the commission's opinion, face a deficit for 1918 of approximately \$76,000, not including a reasonable allowance for depreciation.

The company's business, the commission said, has been in the hands of competent and efficient officers. Economy has been practiced in the management and operation of the lines. The salaries and wages paid are, in many instances, extremely low, although it does not appear that this fact has resulted in inferior service or the employment of incompetent workmen. It is clear, also, that the actual operation of the company's lines is carried on in a reasonably efficient manner. The commission was unable to find where material reduction in the operating expenses could be made without consequential rendering of inadequate or improper service.

From the evidence at the hearing, and from the investigation and report of the commission's engineers, the commission found that the value of the property, actually used and useful for the convenience of the public, was in excess of \$3,500,000. Under normal conditions (without considering at this time the matter of allowance to cover depreciation) the company would be

entitled at least to a 6 per cent return on \$3,500,000, or \$210,000. The commission believed that, in order to prevent injury to the business and property of the company, it is necessary to provide a means of payment of \$179,850, which represents only a payment of 5 per cent interest on the outstanding first mortgage bonds and that preferred stock which is an underlying and contractual security, and the payment of 6 per cent interest on the floating indebtedness carried in bank. This amount does not provide for any return on the \$2,000,000 of common stock, or on the \$1,000,000 of overlying preferred stock.

The commission remarked, however, that in meeting the needs of utilities in emergencies it would not in such periods underwrite usual dividends. In this instance, the company did not pray for anything except that the corporate life and the standard of service of the company should not be impaired. The commission took occasion to state, however, that this is a period of national sacrifice in which each must bear his burden. From these burdens the commission will not relieve utilities while carrying out the intent of the Legislature to keep utilities intact through such chaotic times.

The business of the company is almost entirely interurban in character, and the income derived purely from passenger revenues constitutes approximately 86 per cent of its total revenue (record of 1916). The remaining 14 per cent of its income is derived from the transportation of express, mail, milk, freight and dispatch freight.

In the judgment of the commission, an increase in passenger rates from 2 cents to 2½ cents per mile, together with an estimated \$15,000 freight rate increase already allowed, would increase the company's 1918 revenues approximately \$77,000. This is practically equivalent to the approximated deficit for 1918.

The commission, therefore, ordered the existing passenger rate schedule to be suspended, and new rates, effective on Jan. 23, to be used until further order of the commission. The emergency rate structure follows:

1. A rate of 2½ cents per mile with a reduction of 5 per cent for round-trip tickets.
2. Commutation books as follows: Twenty-five times the increased one-way fare for forty trips within a calendar month; thirty times the increased one-way fare for sixty trips within a calendar month.
3. In lieu of the present interchangeable 1000-mile mileage book, a book containing 2000 1-cent coupons, which book shall be sold for \$17.50, the coupons therein to be accepted at face value for passenger fares.

LETTER TO PATRONS PUBLISHED

After the decision, Charles L. Henry, president of the company, published in all the newspapers along the company's lines a friendly letter giving the main points of the commission's remarks. Mr. Henry closed his statement as follows:

"We fully realize, as will you, that the increased fares and rates we are permitted to collect will barely take care of the increased expenditures now in sight, and may not be enough to take care of those which will unavoidably come. We confidently rely upon your further co-operation in all efforts to keep down unnecessary expenditures and demands upon the company during these perilous times. All street and other improvements which will call for expenditures by the company should

be deferred, as they cannot be made without further increased charges for passenger and freight service.

"With your assistance, we will bend all of our energies not only to the keeping up of our present standard of service, but to a constant increase of its efficiency, so that your communities will all be more than ever benefited. This is especially necessary during such times as the present when steam railroad service is so seriously affected as to deprive the communities of what they have heretofore had at their hands."

A Frank Statement to Patrons

Fort Wayne Company Supports Fare Application With Explicit Explanation to Its Patrons—Fundamentals of Railway Economics Also Set Forth

WHEN the Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., recently made application to the Public Service Commission for the discontinuance of six-for-a-quarter tickets, the company at the same time issued to the public a sixteen-page pamphlet telling in detail its story. A total of 15,000 of the pamphlets were printed and distributed by means of boxes in the cars.

The pamphlet is noteworthy not only because of the frank way in which the company explained to the public the reasons why it must ask for increased revenue, but also because of the painstaking manner in which the general problems confronting all electric railways were set forth.

In introducing the pamphlet the company stated that it was furnishing transportation for less than cost, and that it could not continue to do so and give adequate service. The problem had been studied for the last nine months, and the company was outlining the facts and what appeared to it to be the best solution. Satisfactory service, however, was said to be a problem which could be worked out only in co-operation with the patrons, and the company expressed the hope that the patrons would help it in rendering such service.

The pamphlet then proceeded to describe the financial conditions of the Fort Wayne company, the meaning of current tendencies and the outlook. It then took up the basic economics of electric railway transportation, the meaning of the automobile, the possible future of electric railways, the steps taken by the company to solve the problem and immediate moves which should be made.

In closing, the company stated that the importance to the community of electric railway service was so great that too much care could not be taken to have the problem fully understood. If it were possible to operate an electric railway on a 5-cent fare in Fort Wayne, it should be done. The company would continue to give its best efforts to do this and wanted the help and suggestions of patrons to make the effort a success.

The comments of the company upon the future of the industry, noted above, are worth quoting. They are as follows:

"The general plans for the future development of electric railways have been advanced. The first plan contemplates the use of the light-weight one-man cars with frequent operation. This method it is claimed would improve the service, reduce expenses per car-mile and might offer a solution of the problem. The

Service-at-Cost Plan Approved

F. J. Macleod Says that Gross Revenues Must Be Increased, and Plan of Massachusetts Investors Seems Most Practicable Means

A SERVICE-AT-COST PLAN should be adopted for the electric railways of Massachusetts. Such is the belief of F. J. Macleod, chairman Massachusetts Public Service Commission, as expressed before representatives of the Boston Stock Exchange at the Algonquin Club, Boston, on Jan. 31. This plan seems to him to be the most practicable one under the present system of private ownership and operation.

RAILWAYS NEED MORE NET INCOME

The additional net income which electric railways now need, Mr. Macleod remarked, can be obtained only through a reduction in operating expense, taxes or fixed charges, or through an increase of gross revenue. The companies have already been forced by the pressure of hard times to do their utmost in effecting operating economies, and no further substantial relief is in sight from that source until they are enabled to obtain additional capital for the rehabilitation of their properties.

Decrease of operating expense is also possible through reductions of service, but it would appear that the companies in general have already gone far enough, if not too far, in that direction. Another possible means of retrenchment in certain cases would be the entire abandonment of unprofitable lines. Such action would involve the wiping out of a large part of the investment already made and would in many cases be a real hardship to the communities served. But a railway, Mr. Macleod said, is not primarily an eleemosynary institution. Unless the public is willing to assume the burden of this unprofitable operation, the companies may be forced in some instances to abandon service.

From the present outlook, Mr. Macleod continued, no decrease of fixed charges seems practicable through obtaining lower interest rates. Such rates have steadily risen, and it is doubtful that the end is in sight. As for taxes, however expedient it might be under present emergency conditions to provide for the remission of the local property and the corporate franchise taxes in whole or in part, it is extremely doubtful if any such

second method suggested is to use the electric lines largely for long hauls and rapid transit and have the short-haul business taken care of by motor vehicles which are more flexible of operation in congested districts. This latter plan would mean that electric railway tracks would be laid only on streets where the electric cars could be granted practically full right-of-way. In the larger cities it would take the form of subway and elevated construction where absolute free car movement could be had.

"In cities of moderate size, the first of the plans outlined appears to be more feasible. Either plan will require the expenditure of considerable money for change in equipment or track and roadway, and they have only been advanced by operators as possible future solutions of the problem to be studied and tested. During what might be called the transition period every company will be obliged to make such adjustments as the special local conditions demand."

scheme is practical in the absence of some general revision of the present system of corporate taxation. The commutation tax on earnings, however, which practically makes the companies pay for paving work twice, should be abolished. This the commission recommends not as a remedial measure, but as a simple act of justice.

In the main, however, if the financial condition of the railways is to be substantially improved, the result must be accomplished through an increase in gross revenues. The commission, Mr. Macleod said, believes that it is possible to obtain some increased revenue without an increase of fares by stimulating additional traffic through the operation of one-man cars on a more frequent headway and by using every possible effort to attract short-haul riders. The effective carrying out of such a program would, however, require additional capital which is not now available. The only other method of increasing gross revenue is by a readjustment of fares.

Mr. Macleod then mentioned the service-at-cost plan proposed by Homer Loring, president of the Street Railway Investors' Association, as noted in the *ELECTRIC RAILWAY JOURNAL* of Nov. 17, 1917. Briefly stated, his plan contemplates the issuance of additional capital for the purpose of creating a reserve fund which may be drawn upon temporarily to meet the necessary interest and dividend charges if the company's current revenues are insufficient to meet the cost of service. Fares are to be adjusted up or down as occasion may require, in order to prevent any substantial increase or decrease of the reserve fund.

It is proposed that the commission shall approve or establish a sliding scale of fares which shall automatically fluctuate up or down whenever the reserve fund falls or rises more than 30 per cent. The commission is also required to determine for each company the amount of its capital investment and the proper amounts to be set aside annually for depreciation and other reserve funds. Companies shall be prepared to undertake a reasonable program of rehabilitation satisfactory to the commission, and the commission shall be equipped to exercise a more thorough supervision over operating methods and practices of all companies accepting the act.

SERVICE-AT-COST PLAN SHOULD BE ADOPTED

The commission, Mr. Macleod stated, has already given its indorsement to this plan in principle and believes that it should be enacted into law. Continuing, he said:

"In its main features the service-at-cost plan is similar to plans which are in successful operation in Dallas, Des Moines, Kansas City, Cleveland and other cities. The principle upon which it rests appears to be sound and equitable, and, in so far as it may tend to impress upon the public mind the necessary relationship between cost and service, it should make for a better understanding of the issues involved, for greater public confidence and co-operation, and for smoother administration of the present regulatory system.

"It should also make possible a more ready and flexible adjustment of fares to changing financial conditions and the revenue requirements of the companies than is possible under the present system. In so far as this result can be accomplished without sacrifice of the

public interest, it will tend to place investments upon a more stable basis and to eliminate the delays which are such a frequent cause of complaint against the present system of public regulation.

"The chief misgivings which the commission entertains in regard to the complete success of this plan is the uncertainty as to whether the revenue needs of the companies can in all cases be adequately met by a readjustment of fares. Much experimentation is still necessary before it is possible finally to determine the exact method of fare increase which is best adapted to the special traffic conditions of each company and will give the largest revenue results from the increases allowed.

"The traffic possibilities of the territory served by certain electric railways are insufficient, under any scheme of fares that might be proposed, to meet the cost of operation. Neither the service-at-cost plan nor any other plan based upon a readjustment of existing fares will prove adequate for that situation. For these companies the outlook seems hopeless unless the communities which they serve are prepared by some form of subsidy to bear a portion of the burden of their operation.

"The service-at-cost plan, however, seems to be the best remedy that is practicable under the present system of private ownership and operation. It is important to bear in mind that any plan which will bring about the restoration of credit so essential to any satisfactory solution of the present problem must be one in which the investors themselves have confidence. The service-at-cost plan is recommended by the fact that the investors themselves have proposed it and have given it the support of their expert opinion that it will accomplish the desired result."

OTHER AID MAY BE NECESSARY

In Mr. Macleod's opinion, however, it is possible that no plan which can now be devised will enable the companies, unaided, to meet the conditions with which they are confronted in the present extraordinary situation. If such proves to be the case, the only other remedy is for the State to come to the relief of the companies. As Mr. Macleod had suggested before, this might be done by having the State furnish the companies with needed rolling stock and power apparatus upon the installment plan of purchase, thus giving the companies the benefit of the State's better credit and the lower rate of interest which it is able to command. This, Mr. Macleod said, is only one of several suggestions of a similar character which might be made.

Cost of Preparing Company Publication

The cost of publishing *Triangle Talks*, a weekly organ devoted to the upbuilding of the employees' service and *esprit-de-corps* of the Bay State Street Railway, Boston, Mass., is \$150 a week. This has been published weekly for ten months. From the letters to the company and other evidence, the management feels that the magazine is profitable, especially when the small individual cost of dealing with 6000 men is considered. These facts were brought out by Robert S. Goff, vice-president of the company, at a recent fare hearing before the Massachusetts Public Service Commission.

New Tentative Accounting Classification for New York

Second District Commission Adapts I.C.C. Classification to Its Use—Proposed Classification Requires Depreciation Accruals and Other Changes

THE Public Service Commission for the Second District of New York has prepared a tentative classification of accounts for electric railways and distributed it to the various companies for constructive criticism. The new classification, which, when formally adopted, will supersede the now-effective classification approved in 1908, is intended to bring the accounting requirements of the New York commission into closer correspondence with those of the Interstate Commerce Commission. The proposed effective date for the new classification is Jan. 1, 1919, and criticisms are desired not later than Oct. 1.

The executive committee of the New York Electric Railway Association has filed with the commission a copy of its report on the classification. This committee criticises certain features of it, principally the instructions with reference to accounting for depreciation, and asks for an opportunity to present its criticism more fully. This opportunity will be given, but up to the present no date for a hearing has been set.

POINTS OF DIFFERENCE

Because of the special needs of the New York Second District commission, it has been deemed necessary to subdivide some of the primary I.C.C. accounts and to modify the general instructions in some particulars. The important respects in which the tentative New York classification differs from that of the federal classification may be summarized as follows:

1. The proposed system requires depreciation accruals on all classes of depreciable property at a rate to be stated in terms of a percentage of its cost or book value. The I.C.C. system requires depreciation to be accrued only on equipment, but allows it on other classes of property. Both systems leave to the individual companies the selection of adequate depreciation rates, subject to commission review.

2. The proposed system modifies somewhat the general instructions of the I.C.C. classification with reference to accounting for depreciation and retirements. It also modifies or makes more definite the accounting for rental of equipment, specifically requiring that rent for equipment held under a long-term lease shall be chargeable to income deductions and not to operating expenses.

3. The proposed system requires greater detail in the accounts for power costs, both operating and capital, and subdivides the I.C.C. accounts to make them comparable with the commission's classification of power accounts for electric light, heat and power companies.

4. The proposed system allows a corporation which conducts a general electric light and power business as well as an electric railway business to keep the primary power accounts of an electrical corporation. To the commission it may show the operating power costs as operating expenses of the electric railway department in reports made for that department, and as operating expenses of the electric department in reports made for that department, in each case showing the other department's proportion of such costs through

a transfer credit entry in the reported operating expenses.

5. The proposed system provides for certain subdivisions of other accounts—that is, the substitution of several primary accounts for one account of the I.C.C. classification. For example, "Organization," "Miscellaneous Construction Expenditures" and "Miscellaneous Intangible Capital" are substituted for the I.C.C. road and equipment account No. 550, "Miscellaneous."

The foregoing summary relates to differences between the proposed classification and the I.C.C. classification upon which it is based. There are a number of instances in which the tentative classification differs from the now effective classification of the New York commission, but these are comparatively unimportant.

OPINION OF RAILWAY MEN

The report of the executive committee of the New York Electric Railway Association, mentioned above, was based on a report of a special committee of accounting officers. In its resolution to the commission the executive committee commended the adoption of so many salient features of the standard I.C.C. classification. It criticised the provisions for depreciation accounting, however, as follows:

"With respect to the proposed requirements of the New York Second District commission in the matter of depreciation accounts, we are strongly of the opinion that, at this time, they are too drastic and burdensome upon the carriers. The proposed classification requires depreciation accruals on all classes of depreciable property at a rate to be stated in terms of a percentage of its cost or book value. The Interstate Commerce Commission's system requires depreciation to be accrued only on equipment, leaving it optional with the carriers to accrue, or not to accrue, depreciation on way and structures, and power plant and equipment. The proposed system by suggestion, amounting almost to mandate, attempts to establish the rates of depreciation to be accrued, using the following language in a note: 'Under normal operating conditions depreciation accruals should amount to at least 2 per cent and not more than 5 per cent per annum on the average total cost of all way and structures, or to at least 2 per cent and not more than 10 per cent per annum on the average total cost of all equipment.'

"We believe that the policy of the Interstate Commerce Commission in not requiring depreciation accruals on classes of property other than equipment is wise, since experience has demonstrated that many of the more costly units of other property rightfully may be held as not depreciable, for the reason that safe and economical operation necessitates constant maintenance of these units at a point approximating original physical condition, and original, if not enhanced, value.

"We do not believe that the New York Second District commission should undertake to set either minimum or maximum limitations as to the rate of depreciation to be accrued by carriers. Operating conditions in different localities of the State differ so widely that it is manifestly unfair, inequitable and unwise to attempt by dictum to establish uniformity of rates in depreciation accruals. In reserving to itself the right to disapprove any rule or rate established in a particular case by a carrier, the commission has ample

President Brush Favors Six-Cent Fare Instead of Zone System

In Testifying Before the Connecticut Public Utilities Commission in the Hartford Six-Cent Fare Case He Outlines a Number of Fundamental Considerations Affecting the Establishment of Zone Systems

MATTHEW C. BRUSH, president Boston (Mass.) Elevated Railway, testified before the Public Utilities Commission of Connecticut recently in connection with the Hartford 6-cent fare case, and expressed his belief that the 6-cent fare offers a better solution of the problem of increasing revenue on city lines than does the zone system. Mr. Brush was called as a witness by the Connecticut Company to present his views upon the urban street railway revenue problem in general, and incidentally discussed Boston conditions from the standpoint of remedying present unsatisfactory conditions.

The situation in Massachusetts to-day is such that with practically one exception—a small road in the southern part of the State—there is not a property in the State that can raise any capital or make any additions or improvements. A substantial portion of the companies are paying no dividends. There has been very little development in the Massachusetts properties in the past few years, due to the fact that net earnings have been insufficient to permit the issue of securities at par, no issue below par being permitted by the Massachusetts laws. Practically all street railway securities in the State are selling at less than par, with the result that it has been impossible to issue any securities whatever. The maximum price at which Boston Elevated stock has ever been issued was \$155 per share. Taking the entire capital stock of the company, the average paid-in price is \$112.50, and the stock recently closed at about \$29. The last dividend was passed. In 1917 3.5 per cent was paid. The decrease in the value of the stock is attributed to the decrease in the dividends, and the latter is due to decreased net earnings resulting from increased cost of labor and material.

"There will always be an element of risk in the street railway business," said Mr. Brush, "due to its rapid development. The average layman may not realize it,

but four years ago we installed a 15,000-kw. turbine which was the finest thing the art had produced. Within the last twelve months we have installed a unit of 35,000-kw. rating, which will generate power at about 20 per cent less per kilowatt-hour. This makes the unit of five years ago at least semi-obsolete. I doubt if there is any other business where the development is as rapid. The same is true in the development of the type of car used. To-day we run in the (Cambridge) subway the biggest electric car in the world. It carries from 250 to 300 people, makes a run in eight minutes through a \$9,500,000 subway, and the car costs about \$17,000. That may be contrasted with the horse car. The opportunity for initiative on the part of the board of directors has been gradually taken away by regulations and restrictions, so that the man in charge of the property is practically subject to the judgment of some one as to what he shall do. Almost every labor case becomes a matter of arbitration. The very nature of our business does not permit us to regulate the price of our commodity or the expense we must go to to manufacture it."

FIVE-CENT FARE INADEQUATE

Mr. Brush said that the 5-cent fare was never enough to enable a road to take care of depreciation and obsolescence. Material costs anywhere from 60 to 700 per cent more than it did two years ago. The Boston Elevated recently signed a contract for brakeshoes which was 83 per cent higher than last year and 263 per cent higher than two years ago, and the lowest bid was accepted. A Cambridge subway car originally cost \$10,500, compared with \$22,500 to-day. One hundred surface cars recently purchased at \$8,500 would now cost about \$11,000 each. Wages are increased by the agreement with the union expiring in May, 1919, amounting to \$450,000 the first year.

UNIT FARE PREFERABLE TO ZONE SYSTEM FOR CITIES

J. F. Berry, counsel for the Connecticut Company, asked the witness his opinion of the suggestion that a line be drawn around the city of Hartford 2½ or 3 miles from the center, and that the charge be on a mileage basis outside. Mr. Brush said that there is no question in his mind but that a unit-fare system, whether it is 5 or 6 cents, or more, has done more to develop this country than any other one feature. At Boston, with a system covering 80 square miles and thirteen municipalities, the unit-fare system has caused development in the outlying districts, and it has been an asset to the community and to the merchants of Boston. People are likely to endeavor to locate themselves with reference to their downtown work on the basis of time rather than distance, and this has been one of the difficulties of the company. The building of \$35,000,000 worth

(Concluded from page 228)

power and scope, and, with all of the facts, both physical and financial, in any particular case before it, can prevent any carrier from either under-accrual or over-accrual of the element of depreciation."

The executive committee, therefore, expressed its dissent to the depreciation requirements of the tentative New York classification and recommended the substitution therefor of the depreciation accounting requirements as set forth in the I.C.C. uniform system of accounts. The resolution was signed by Wilbur C. Fisk, Edward A. Maher, Jr., W. O. Wood, James E. Hewes, T. C. Cherry, H. B. Weatherwax and William F. Stanton.

of subways merely extended the average ride from $2\frac{1}{2}$ or 3 miles to about 5 miles, which has made a 5-cent fare prohibitive. On the average, the company cannot carry people 5 miles for 5 cents.

"If you established a zone system around Boston," said Mr. Brush, "you would immediately congest every district you have tried to relieve. The practice in Massachusetts, with the exception of a straight inter-urban independent line, has been, when making a modification of rates, not to change the fare limits at all. The Public Service Commission has maintained that it is unfortunate, where people have, say, for twenty-five years, arranged their domestic and business life in a way to get to and from their work at a certain price, to treat one part of that district differently than another. In our case, if you tried to establish a zone scheme in lieu of the 6-cent fare which we think is the proper solution, you would have to bring the zone line so close to the heart of Boston that one-half of your passengers would have to ride the other side of it, paying, say, 5 cents inside and 2 cents outside; and to get the equivalent of a 6-cent fare, one-half the passengers would have to ride at 7 cents. If you undertook to do that, entirely aside from the equity of it or the good of the community, there would be created an impossible condition. We could not possibly collect the fares.

"In Cleveland and Milwaukee that zone line occurs at a point where the patronage on the line is practically nil, so that the collection of fares in those cities is a different matter. If that idea were applied around Boston you would have to have the zone line so far out in the country that the earnings would not be increased, the distance for 5 cents still being too great."

Mr. Brush emphasized the injustice of placing a zone line through suburban territory so as to discriminate between home owners who have located in neighborhoods on the understanding that equal fare treatment is to be accorded. It is impossible to segregate the different classes of traffic. If the Washington Street tunnel and the Cambridge subway should be filled with sawdust for ninety days the Boston stores would be forced into the hands of receivers. The witness held that zone fare collection is impossible on an elevated line.

Mr. Brush said that he had recently gone over a study of the zone system as it might be applied to the Boston Elevated Railway, and the best that could be shown for the zone system was a yearly increase of revenue of \$750,000. The company actually needs about \$3,000,000 more per year. A zone arrangement which would yield \$3,000,000 would present a condition which would be impossible from the standpoint of fare collection. Further, it was figured that to obtain \$750,000 additional revenue by the zone system the company would have to spend \$250,000. Mr. Brush said that if the company had the authority it would advance fares to 6 cents at once. Regarding the question of having city lines pay for the outlying lines, the witness said that he believes in considering a community as one unit. Any attempt to make the lines in Brookline (Boston district) self-supporting, for example, would be ruinous. It has even been suggested that a community as a whole should subsidize the property rather than to have the tracks taken up.

The solution of the whole street railway question, the witness said, is the "service-at-cost" scheme. Public service commissions throughout the United States were

created for the purpose of assuring to patrons service at cost. "There is no question in my mind," said Mr. Brush, "but that the commissions, or most of them, have succeeded in seeing to it that the public got service not only at cost, but at less than cost. The difficulty lies in the fact that the public does not believe it. The patrons do not think that they are getting service at cost. The investor knows that he is not getting the service of his funds at cost. The service-at-cost scheme has been tried at Cleveland, and recently it has been introduced in Dallas, and is now in effect in Toledo, and, I think, in Kansas City. Other places are considering it. The present commission appointed by the Massachusetts Legislature of last year at present is preparing a report, and is considering at this time a scheme for service at cost which provides a graduated scale of fares, to go up and down automatically as the rehabilitation fund is increased or depleted. That is exactly the Cleveland scheme, with the exception of avoiding the setting of a maximum. The Cleveland scheme will be a failure if the time comes when the maximum in the scale is reached." Mr. Brush deprecated the ordering into effect of tickets in 6-cent-fare decisions in view of the increased cost of living and the justice of paying more for transportation. Many commodities have increased from 50 to 100 per cent, and it is to the credit of the management of the railways that so small an increase as 1 cent will save them.

Mr. Brush said that 100,000,000 free transfers are issued yearly on the Boston system, and that if a charge should be levied against these it would be impossible to withstand the pressure for the establishment of through lines which would be the result. No community can afford to support a subway out of the car rider the witness stated.

Manufacturers' Night at New England Street Railway Club

"**MANUFACTURERS' NIGHT**," a regular annual event, was celebrated by the New England Street Railway Club on Jan. 24 at the Hotel Somerset, Boston, Mass. President A. H. Ford of Portland, Me., called the meeting to order after the usual dinner, and nominated Charles C. Peirce, General Electric Company, Boston, to serve as master of ceremonies. A toast was drunk to the health of the men at the front and a vaudeville entertainment was enjoyed during the evening, about 250 members and guests being present. The committee in charge of the evening's entertainment consisted of: John W. Belling, General Electric Company, Boston, chairman; L. P. Morris, Westinghouse Electric & Manufacturing Company; W. W. Field, Barbour-Stockwell Company; J. W. Nason, Frank Nason Electric Company; A. A. Hale, Griffin Wheel Company; G. W. Denyven, E. P. Sanderson Company; and W. L. Boyer, Bemis Car Truck Company.

Cars of the Louisville Railway which leave Louisville for Camp Zachary Taylor, the federal army cantonment south of the city, are now stopped at the entrance to the camp where guards require all who fail to produce passes to leave the cars. On the first Sunday that the cars used the extension into the camp the guards, with orders to stop people but not cars, let several thousand into the cantonment before the orders were amended.

Unprecedented Operating Difficulties on Electric Railway Properties

Canvass Made by This Paper Discloses Conditions, an Understanding of Which by the Public, Would Insure Sympathetic Co-operation—Reports from Various Sections Analyze the Situation

THE war and the weather have combined with previously acting agencies to render the operation of electric railways more difficult during the past few weeks than ever before in the history of the business. To learn just what the conditions are the editors of this paper have secured telegraphic and other statements of the situation in typical cities and an attempt is made here briefly, but graphically, to reflect it.

COLONEL KEALY WIRES DETAILS OF THE SITUATION IN KANSAS CITY

In a telegram just received from Philip J. Kealy, president Kansas City, Mo., railways, he states that local service has been delayed very little by severe weather, but that the revenues of the company have been severely affected. A number of trips have been lost during the severe weather due to crews failing to report rather than to weather conditions preventing operation. About 6 per cent of the trips have been lost on account of labor shortage. The labor turn-over is now approximately 8 per cent per month, as compared with a corresponding turnover in normal times of about 3 per cent.

It is exceedingly difficult to get competent trainmen and repairmen. The government has been taking out extra repairmen by trainloads for government work, principally shipbuilding in the West. As a result of the difficulty of securing men, both trainmen and repairmen, employment standards have been lowered, resulting in most careless operation of cars and an unusually large number of "pull-ins" daily on account of defective equipment. The number of "pull-ins" has increased 300 per cent, and the number of collisions over 200 per cent in the past four months.

The labor shortage could be relieved considerably by the employment of women, especially on trailers, but the local men have taken the position that they will strike if any women are placed on the cars.

The most serious trouble is fuel shortage. From August to December service was cut from 10 to 25 per cent daily in the maximum rush period in an effort to conserve fuel, but the fuel situation is becoming worse instead of improving, and only the coming of more clement weather will relieve it.

LARGE LABOR TURN-OVER DECREASES EFFICIENCY

J. H. Hanna, vice-president Capital Traction Company, Washington, D. C., wires that the company's service has suffered many delays due to weather conditions, particularly since Dec. 26. Since that date from ten to forty-six trips daily have been omitted on account of illness of trainmen. Nothing like this has occurred in the company's experience. The normal weekday schedule calls for 1914 trips. From Jan. 1 to 24 124 trainmen were employed, 88 leaving the service during

this period. The average per month for 1916 was 32 in and 30 out. The company has had to make the qualifications for trainmen much less severe than formerly.

Labor conditions on the Lehigh Valley Transit lines, according to H. R. Fehr, president, are similar to the above. Many employees have left, attracted by offers from munitions and other industrial plants, so that the force as a whole has decreased in effectiveness. The transportation department has remained nearly normal, but in other departments the present monthly turn-over of labor is 50 per cent as against a normal turn-over of 10 per cent.

The quality of the coal which the company is receiving is not up to standard, making it difficult at times to keep up steam in the power house. Not only are deliveries of material for maintenance much delayed, but practically all the materials have increased in price and decreased in quality.

Mr. Fehr also mentions that from Dec. 15, 1917, to date there have been ten snow or sleet storms accompanied by unusually cold weather and frequent high winds. These conditions have taxed the equipment so heavily that the percentage of "pull-ins" has doubled, and tripper service has been curtailed from 50 to 75 per cent. Early in 1917 twenty-four double-truck cars, with seating capacity of fifty-seven, were ordered, but at present just two of these cars have been received, the delay being due to the priority of war orders on which the car-building plant was working.

Another trouble has been that due to the obstruction of tracks by vehicular traffic it has been impossible to maintain schedules.

The company serves the Bethlehem Steel Company, with its 28,000 employees, of whom probably 25 per cent use trolley service under normal conditions. At present, in order to facilitate the transportation problem, the Bethlehem Steel Company, in co-operation with Mr. Fehr, is studying the question of staggered working hours. The company has also presented to the City Council of Allentown a plan to abolish twenty-seven half-block stops, and has been assured of co-operation in every possible way toward bettering present existing conditions.

ALBANY, N. Y., IS MORE FORTUNATE

An exception to the rule as to operating difficulties, presumably due to its location, is furnished by the United Traction Company, Albany, N. Y. H. B. Weatherwax, vice-president, reports that service has been little interfered with by weather conditions, and that labor shortage has caused no loss of trips. The labor turn-over is less than usual, and there is no difficulty in keeping competent platform men and repairmen.

There have, of course, been traffic delays due to weather conditions, but no trips have been lost. There

has been some difficulty in keeping competent repairmen, but applications for platform jobs have, for the past two months, been above normal.

STATEMENT BY PRESIDENT T. E. MITTEN
OF THE P. R. T.

To put the situation clearly before its patrons, the Philadelphia Rapid Transit Company has issued the following statement signed by Mr. Mitten:

This company, in common with all steam and electric railway carriers of the country, has been suddenly confronted with a super-normal demand upon its facilities at a time when the scarcity in the labor market and the delays in the delivery of materials have made impossible the immediate securing of additional equipment or even the full maintenance of usual standards in the repair and operation of the present facilities.

At this time also the United States Government and the State Fuel Administration are imposing upon public utilities the strictest conservation of coal and recommend all possible saving in the schedules and heating regulations.

The company has thus far avoided actual reduction in the schedules but it has been greatly hampered in maintaining the full schedules by cars being held in the barns because of shortage in such material as armatures, wheels, bearings, etc. All of this material has been on order for several months but the manufacturers are unable to make deliveries either because of the demands upon their own plants or because of the congestion in transportation.

This management is now in consultation with responsible representatives of the government looking to the bringing about of needed relief including the granting of priority orders on equipment and material required in meeting the present situation.

While preference in the assignment of available cars must be necessarily given to those lines serving the shipbuilding and munition plants in various sections of the city, the company is exerting its utmost not to discommode any of its patrons unavoidably. To this end it bespeaks the continued patience and co-operation of the public in its endeavors to maintain the best service possible under the unprecedented circumstances now existing.

HOW SNOW AFFECTS ELECTRIC RAILWAY OPERATION

A typical picture of the ways in which snowfall interferes with service is furnished by a report sent in by L. S. Cairns, general manager Eastern Pennsylvania Railways, Pottsville, Pa.

The effect of the 14-in. fall of Dec. 13 and 14 was that all operation was discontinued at about 11 p. m. on Dec. 13. Five divisions, or perhaps two-thirds of the cars operated, were put in operation at some time during the day of Dec. 14, and four divisions, or practically the remaining one-third, during the following day. One division with one car operating on the end of one of the lines was not in operation until the morning of Dec. 16. In other words, 50 per cent of the lines were opened and operated within twenty-four hours, 40 per cent more within forty-eight hours, and the remaining 10 per cent within the next few hours.

On Jan. 15 the company experienced some delays due to a 5-in. snowfall. On Jan. 26 3 in. of snow fell and on Jan. 28 6 in. additional of snow fell. These later snowfalls did not seriously inconvenience the general operation, although cars were operated late and in a few cases delayed due to snowdrifts at some outlying points.

This company has not as yet suffered any special inconvenience due to shortage of labor, as far as platform men are concerned, although some handicap to the work is felt in regard to shortage of skilled mechanics and lack of track men.

Strenuous Days for Repair Force on British Columbia Electric Railway

A SEVERE storm which lasted for three days recently caused a great deal of damage to the Fraser Valley Branch of the British Columbia Electric Railway. Heavy rain fell, freezing as it came in contact with wires, poles, rails, etc. The ice formed to a thickness of 4 in. and 5 in. on standing objects, and this weight, together with the wind, caused many poles containing high-tension trolley and telephone wires to fall. On one 2-mile stretch of track 146 poles fell and 106 on another. Wrecking equipment, consisting of three steam locomotives, one steam derrick, two line cars and three work trains, was rushed to the scene of trouble and proceeded with clearing operations without the aid of electrical energy. Ice formed almost as quickly as it could be removed and in many places the poles had



TRANSMISSION LINES FELLED BY ICE AND WIND

fallen across the center of track, making progress very slow. At the end of three days milder weather and a "Chinook" wind took the ice and snow. This caused exceeding high water in all streams and rivers, washing out the tracks in many places, at one point leaving a gap 65 ft. long and 20 ft. deep, other washouts being $\frac{3}{4}$ mile long and 1 to 4 ft. deep. Train service was operated to the point of clearing, part way by trolley and the balance by steam power.

It was estimated that a total of about 550 poles were felled. To hasten operation poles with trolley bracket arms attached were placed at intervals of approximately 200 ft. with the intention of later placing additional poles at intervals of 100 feet. The trolley wires followed the erection of the poles and only sufficient other wire was strung as would permit re-establishing light, power and telephone connection. A fair estimate of the cost of repairs was placed at \$150,000. Shortly after the interruption to service, three passenger trains, and a milk, way-freight and express service were being operated over the whole line. This service could not be augmented until trolley wire and roadbed were more substantially repaired.

The Public Service Commission for the First District of New York will soon fly a war service flag containing 257 stars. Two members of the commission, Col. William Hayward and Maj. Henry W. Hodge, and many members of its staff are in one branch or the other of the United States service, and some are already at the front in France.

Moving Cars Through Congested Intersections*

As a Solution of This Problem and a Step Toward Rapid Transit the Author Suggests an Appeal to the Public to "Step Lively"

By A. GABOURY

Superintendent Montreal (Que.) Tramways

EVERY electric railway, and more especially one engaged in transporting the population of a big city, has its hours of trouble. Many of its problems have been solved as they presented themselves, but there are others that are not so easily handled. Among them, probably the latest, is this: "How are we going to move at intersections the ever-increasing number of cars?" Transportation men have spent many an hour thinking about how to do it. Has the problem ever been solved? I doubt it.

Why has this new problem not come to the top? Is it not because railways, in endeavoring to solve the other problems in connection with increasing traffic, have added car after car to their existing routes, in many cases on account of the refusal of city councils to foresee the needs of the future and provide for them by establishing new routes?

The public expects principally one thing—service. To it the matter is very plain. The more passengers there are, the more cars are needed. To a certain extent the demand can be met and congestion of passengers taken care of, but there is a limit beyond which lies trouble. The more cars put on a line, the slower each unit moves and the more congested that line becomes, until finally the question arises as to how to take care of the cars at intersections.

The first problem of congestion of passengers simply meant extra equipment, but the problem caused by extra equipment on already overloaded routes is not so easily solved. Cars can be rerouted to avoid curving at intersections and new lines can be built to parallel existing ones, but since the intersections definitely limit the number of cars that can go through, congestion results after this limit is reached. If every effort on the part of the railway does not bring the solution, let it then apply politely to the traveling public to share the responsibility and to help. But how? By stepping lively, by moving smartly.

It would certainly facilitate the movement of cars, especially at intersections:

If every passenger would remember that the rear of the car does not stop opposite the street corner, but about 50 ft. back, and would stand at this distance from the corner.

If every passenger would move smartly when getting on or off a car.

If every passenger would have his fare ready and would go inside the car without delay.

If every transfer passenger would present his transfer unfolded so the conductor could examine it quickly and give his attention to the next passenger.

If every passenger after paying his fare would walk to the front of the car, ready to alight by the front exit at his stopping point, and thus allow other passengers to board at the rear while he was alighting at the front.

If every passenger would prepare in advance to get

off at his corner by moving toward the exit in readiness to alight the moment the car stopped.

If every passenger would buy his tickets in advance and have exact fare ready at the intersections.

Yes, certainly all this would help, but how can we obtain this help? By no other means than by a serious and well-conducted publicity campaign along the above lines with the use of either the public press or the windows of every one of the cars. After the campaign has been thought out seriously and plans of action carefully laid down, go ahead frankly and sincerely. Be sure that the wording of your literature will inspire confidence and command respect and esteem, and that it will convince the public that the results obtained will be to its own best interests.

How One Company Cured "Jitneyitis"

Better Public Relations Work of the Atlantic City & Shore Railroad Won the Support of the Public Against Unfair Competition

By JOHN M. CAMPBELL

Secretary and Auditor, Atlantic City & Shore Railroad, Atlantic City, N. J.

ACCORDING to official figures the first jitney appeared upon the public streets of Atlantic City, N. J., on March 13, 1915. This form of transportation immediately became popular, no doubt owing to its novelty, and the number of jitneys increased daily. Supply and auto dealers encouraged them, and by mid-summer 600 jitneys—nearly all Fords, and second-hand ones too—had taken complete possession of Atlantic Avenue, the principal thoroughfare of the resort and the right-of-way of the main stem of the Atlantic City & Shore Railroad system. This great number of unrestricted and unregulated vehicles not only developed most difficult traffic problems for the police, but practically prevented safe travel for private vehicles and pedestrians.

City rulers made several ineffectual attempts to straighten out the tangle. The passage of an ordinance imposing an annual tax of \$25 caused a few local jitney drivers to discontinue operation, only to turn their badly-worn cars over to floaters from other cities who continued to skim the cream of the short-haul traffic in the busy section. The inevitable soon happened. The electric railway, deprived of its principal revenue, made earnest but fruitless appeals to the city rulers for the enactment of more rigid regulation of this unfair competition. The earnings so decreased that the company was forced to default interest, and it was soon forced into receivership.

The railway, left to fight its own battle, then started a campaign of educating the public to an appreciation of facts. The first move was the publication of a little four-page weekly pamphlet, *Trolley Talks*, in which patrons of the line and others were shown the importance to them of the continuation of the electric railway system, its intimate relation to the progress of the city, and the utter dependence of the suburban communities upon a safe, high-grade system of electric transportation.

A department of public relations was established, and criticisms and suggestions from patrons were invited and received. Every complaint was carefully analyzed and a remedy applied. In case a patron had a grievance, the cause was ascertained and a courteous, uniformed

*Abstract of address read before recent meeting of Canadian Electric Railway Association.

Safety Campaign with New Note

Northern Ohio Traction Makes Point that Recklessness Is Unpatriotic Because It Causes Accidents

BY E. BURT FENTON

Publicity Agent Northern Ohio Traction & Light Company, Akron, Ohio

SELF-PROTECTION as a patriotic duty is the keynote of a publicity campaign in the interest of safety, completed at Canton, Ohio, on Nov. 10, 1917. The campaign was conducted by the Northern Ohio Traction & Light Company, which operates the street railway system of the city, as a part of a comprehensive movement within the company's organization for the elimination of accidents.

The purpose of the publicity campaign is described in one of the fourteen articles in these words:

This company can prescribe safety rules for its employees and enforce them. It can equip its cars and its lines with the best of safety devices—and is doing so as rapidly as possible. It can place danger signals and other protective devices where they ought to be. It can use every device and precaution known to the Science of Safety—and has done so or is in process of doing so.

But—

It cannot make you careful if you choose to be reckless. That part is up to you.

Carrying out the idea, the non-employed individual was urged daily for two weeks to "Be careful. Be careful. Be careful!" The ordinary dangers of street travel, whether afoot or in a vehicle, were pointed out and each individual exhorted to keep his eyes open.

In all of the fourteen articles, which were run in

(Concluded from page 233)

employee was sent to make amends. The latter plainly tried to show the desire of the company to avoid a repetition of the objectionable occurrence.

The motormen were carefully studied, and the most efficient one—curiously enough, the most popular one with the riding public—was selected for special work. His sole duty was to see that every motorman operated his car just as nearly like the model as possible. Similarly, a conductor popular with the riding public was carefully observed, and his actions and methods were copied and applied by the other conductors with the most pleasing results.

After many months of such conditions the management was sure of having secured a very efficient means of getting right to the hearts of the patrons. They recognized what had been done for them and would be done in the future, and they showed their appreciation by a new attitude toward the system. Then a final appeal was made to the city rulers. They, at last feeling the trend of public sentiment and realizing the true situation, in May, 1917, passed an ordinance barring the jitneys from operation in competition with the railway.

The ordinance has been carried to the higher courts by the jitney interests, but to date the city has been sustained in its action. Meanwhile the private vehicles and pedestrians are once again able to travel safely on Atlantic Avenue, the electric railway system is looking forward to a prosperous season, and the general expressions of satisfaction on every hand at the elimination of the jitney from Atlantic Avenue show a realization that the jitneys in competition with an adequate electric railway system are an unmitigated nuisance.

liberal newspaper space over the signature of the company, it was put squarely up to the individual that he owes it to his country to keep himself in proper condition to do the work of the country, that the success of the army abroad depends upon the efficiency of each individual at home. One article, having for its text the fact that the people of Canton had subscribed double

Need of "Whole Men"

Shortly after the beginning of the European war in 1914, over a million workmen in the United States, subjects or citizens of the nations at war, were called to the colors of their respective countries. This left a wide gap in the ranks of American industry—a serious labor shortage.

Almost simultaneously, American industry began an unparalleled expansion, demanding more and more labor as factories doubled and tripled their capacities—creating a demand for labor unequalled in history.

Within the present year nearly a million men have been taken from the ranks of industry to serve their country under the Stars and Stripes, and the war plans of the government contemplate the enlistment of five or six times that number. This vast army must be equipped with the myriad of things—arms, food, clothing, shelter, munitions, airplanes, motor driven vehicles, etc., which an army requires. These needs call for a vastly increased production in every line of raw materials and manufacture.

All along the line, as the need of more and more labor arises, there are fewer and fewer men to perform it.

This means that industry—all industry—has greater need of **WHOLE MEN** than ever before, men in good health, with all their arms and legs and bodies in good working order all the time—"on edge" to give the best there is in them.

Under the circumstances, it is more than foolish—it is almost criminal—for any individual to needlessly risk life or limb.

IT IS A PATRIOTIC DUTY TO AVOID ACCIDENTS.

If you must occasionally "take a chance" in your haste or heedlessness, wait until the man-power of your country is less valuable than it is now.

Be careful. Be careful. **BE CAREFUL.**

THE NORTHERN OHIO TRACTION & LIGHT CO.

N. B.—Another talk on Safety tomorrow.

GET THE HABIT

It is just as easy to form a good habit as a bad one.

"Taking chances" is a habit.

Running vehicles recklessly—getting on or off moving cars—crossing streets between regular crossings—walking or driving in front of moving cars—falling to look both ways before crossing a street or a railway track—all these become habits with the people who do careless things. The fact that up to date your carelessness has not brought injury to yourself or someone else is no argument for continuing to be careless. There's a first time for everything.

Caution can be made habitual. A few days of watchfulness, a little exertion to remember that there is danger at every street crossing, a little care in running a motor vehicle, forced for a time, will soon become so much a habit that you will soon become unconsciously cautious. You will look out for your own safety and that of others without thinking about it.

There are hundreds of people right here in Canton who have acquired the habit of caution—who avoid danger by looking out for and avoiding it. It comes as natural to them to slow down their machines at corners and other danger points, to look both ways before crossing a street, to wait for the car to stop before getting on or off—just as natural as to get hungry at meal time. Doubtless these people at some time had to learn to be cautious, but they learned it so well that they have no occasion to think of it now.

You can cultivate this habit, if you will.

In the long run, you'll find your way through crowded streets just as quickly and get where you are going just as soon as those people who take foolish chances with their lives and limbs.

Whether you are afoot or in a vehicle it pays to—

Be careful! Be careful! **BE CAREFUL!**

THE NORTHERN OHIO TRACTION & LIGHT CO.

TYPICAL ADS IN SAFETY SERIES

the city's quota to the Second Liberty Loan, under the caption "A 200 Per Cent City," the patriotic idea was expressed thus:

It is just as much a patriotic duty to protect your body from injury as to loan your money to Uncle Sam. He needs your money—will need more of it. But he needs *you* even more—your brains, your muscles and your skill. Are you protecting these national assets? * * * Uncle Sam needs *you*—your mind, your body, your bodily members—and he needs *them all together*, not scattered around. Make Canton a 200 per cent city in *Safety* as well as *Money*.

No attempt was made to duplicate the many "don'ts" usually made part of similar campaigns, but the "be careful" slogan was used every day as something that could be easily remembered and always kept in mind. One advertisement was devoted to the elusiveness of the "Go" signal at street crossings, so far as pedestrians are concerned.

This publicity campaign was used simultaneously with a series of lectures to the school children of Canton by Mrs. Minnie Riddle of the Chicago Bureau of Safety, who was engaged by the company for that purpose. Mrs. Riddle's talks to the children related to safety precautions in the home, on the playground and on the streets, and were adapted to the understanding of the pupils of all grades. During her stay she addressed the pupils of every school room in the city, public and parochial, making about 125 addresses in all.

Mrs. Riddle will conduct similar speaking campaigns in the schools of all of the communities served by the Northern Ohio Traction & Light Company, beginning soon in Akron.

CONSTRUCTION, MAINTENANCE AND EQUIPMENT

ENGINEERS, MASTER MECHANICS AND OTHERS WHO HAVE DEVELOPED ECONOMICAL PRACTICES, OR WHO HAVE WORTH-WHILE IDEAS ARE INVITED TO TELL READERS OF THE JOURNAL ABOUT THEM IN THIS DEPARTMENT

Car Axles—Their Design, Manufacture and Service

PART I—ESTIMATING FIBER STRESS

BY NORMAN LITCHFIELD

ATTENTION was recently called through an editorial in this paper to the necessity for uniformity in the production of a high quality axle for passenger service under electric railway cars. There can be no question as to the importance of this feature, and furthermore, it presents one of the most difficult problems in the attainment of that desired ideal, the absolutely safe axle. It, however, forms but one of a group of problems entering into the matter, and it is the purpose of this article to review the history of the development of the modern axle, and to set forth in convenient form the various points of design, manufacture, tests and inspection, and operating methods which experience has proved desirable. No feature of car equipment has received more attention, and rightly so, for the axle represents the last link between the safety of passengers and serious accident—so much so that on properties handling large numbers of passengers, the operating officials no longer look upon an axle as a mechanical detail to be purchased as cheaply as the state of the market and the dexterity of the purchasing agent will permit, but rather as a piece of accident insurance the value of which depends upon the care with which it was prepared and the stability of the company issuing it. The axle, therefore, must meet the strictest requirements of correctness in mechanical design and high quality of material, it must be produced as uniformly as possible by competent and trustworthy parties under proper checks and inspection, and it must be used under careful methods of installation and inspection during operation.

An axle is primarily a beam, cylindrical in section, supported at two points—the wheel hubs. With the car stationary the loading consists of the car truck and passenger weight acting vertically on the journals, and a certain portion of the motor weight on the motor bearings. In service, however, the axle becomes subjected to a variety of forces, some of which are exceedingly difficult of determination. The swaying of the car, especially through curves and switches, produces a heavy side thrust of the wheel flange against the rail, thereby applying a powerful force couple to the axle at the wheel hub. To this are added the vertical oscillation of the car on its springs, the effect of im-

pact at rail joints, the torsion of the motor, the braking action, the gear vibration, etc. Furthermore, it is well known that the strain on a member is much more severe when for any cause the forces acting thereon are reversed rapidly in their direction, the magnitude also depending on the rapidity of the reversals, the effect of which on an axle running with 36-in. wheels at say 45 m.p.h. is equivalent to 840 reversals per minute.

While it is not practicable to calculate all of the forces, it is feasible to determine some of them and to analyze their combined effect on the axle, with the resulting fiber stress. Then from experimental data and experience the factor of safety necessary or desirable to use in the design can be judged. The fundamental

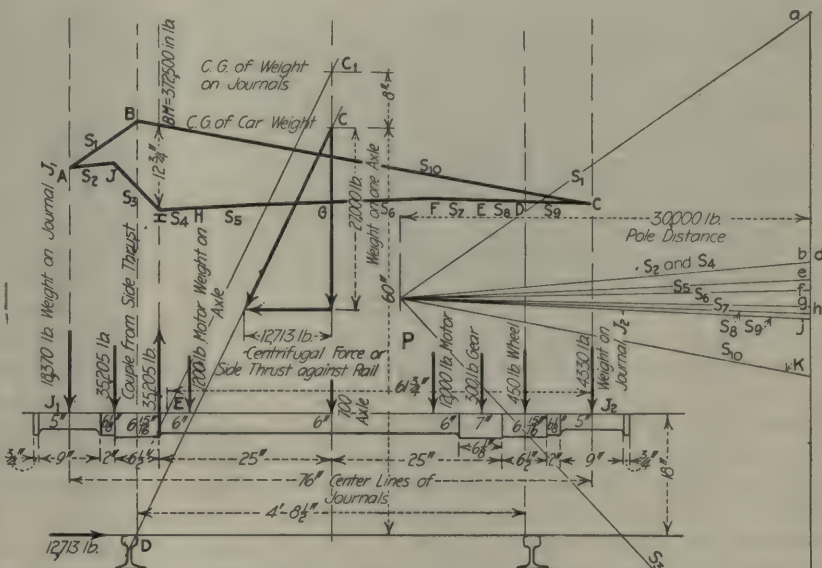


FIG. 1—DIAGRAM OF FORCES ACTING UPON AN ELECTRIC CAR WHEN ROUNDING A CURVE

facts are admirably covered in a report of a committee headed by E. D. Nelson and contained in the proceedings of the Master Car Builders' Association for 1896. Time has very largely borne out most of the deductions reached in that report and for the convenience of those to whom this report is not readily available such passages as are of immediate interest are quoted here.

The committee first turned its attention to the analysis of the forces acting on a car axle, these being worked out by the late Prof. A. J. DuBois of the Sheffield Scientific School of Yale University. A calculation was first made of the location of the center of gravity of the car under consideration, which was found to be approximately 6 ft. above the head of the rail. The committee then ascertained by a road test that the vertical oscillation of the car on its springs added about 26 per cent to the load on the journals

when stationary. This, it should be understood, is purely vertical oscillation and is not to be confounded with the shifting of the load from one journal to the other due to the swaying of the car. The maximum effect of the latter is assumed to be obtained by a horizontal force acting through the center of gravity of the car, and of intensity just sufficient to tip the car over. A simple calculation will show that at a distance of 6 ft. from the top of rails set at the standard gage of 4 ft. 8½ in. this force is equal to $0.4023W$, where W is the weight of the car. Hence the centrifugal force of the car rounding a curve is assumed as equal to 40 per cent of the weight. This, it may be said in passing, is equivalent to rounding a 600-ft. radius or 9-deg. curve at the rate of 60 m.p.h.

Two methods of calculating the bending moments are given—one analytical and the other graphic. The latter forms rather the more convenient method, it being the well-known graphic solution of forces and moments by use of the force and equilibrium of polygons, which needs no explanation here, as it is fully explained in all standard works on mechanics. For an

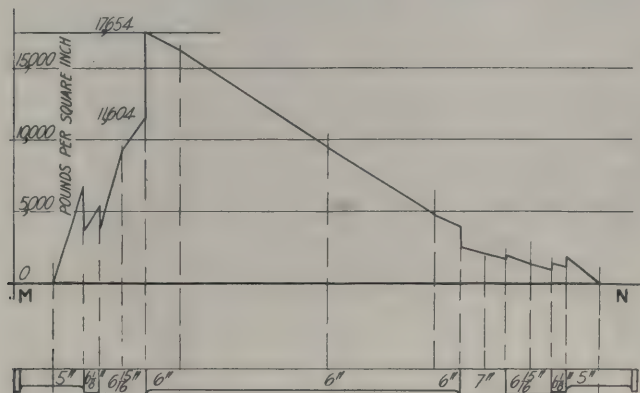


FIG. 2—STRESS DIAGRAM DRAWN FOR THE
A. E. R. E. A. AXLE

example we give in Figs. 1 and 2 a graphic analysis of the A. E. R. E. A. standard axle "E. C." having 5-in. x 9-in. journals with 6 in. diameter between wheel hubs. This is rated at a maximum loading of 27,000 lb., representing on two four-wheel trucks a car weighing with passenger load approximately 54 tons, equivalent to the average interurban car. While this car may not attain a maximum speed of 60 m.p.h., still the much smaller radius of curves in general use on electric lines as compared to steam practice makes the development of the full centrifugal force equally or even more likely.

An analysis of the weight in an average electric car shows that the great mass of the trucks, motors and equipment lowers the center of gravity of the whole car down to 5 ft. from the top of the rail, whereas the M.C.B. committee give 6 ft. for an ordinary steam coach. As the center of gravity of the electric car is lower than in the steam coach it follows that the side thrust from centrifugal action necessary just to overturn the car is greater than on the steam car, and a greater force can thus be exerted on the axle. The small radius curves and less favorable track conditions usually existing on interurban lines makes quite possible the exertion of this full force.

The stresses in the axle are most conveniently calcu-

lated by the graphic method, using the equilibrium polygon. For convenience of reference, the following explanation is given of its application to the axle in question.

As the basic assumption is that sufficient centrifugal force is exerted just to overturn the car, it follows that the resultant (through the center of gravity) of the car weight and the side thrust must pass through the head of the outer rail, thus relieving the inner rail of any pressure. As the weights of the wheels and gear and of the axle itself and a portion of the motor weight are not borne on the journal, these items are deducted from the total and the center of gravity of the masses whose weight is on the journal determined. This is found to be 68 in. above the rail. The resultant of the weight on the journal and the corresponding centrifugal force is parallel to CD or C_1E , Fig. 1.

The division of the weight between the two journals will then be in the proportion $\frac{EJ_2}{J_1J_2}$ so that the weight on the outer journal is 18,370 lb. and on the inner journal 4330 lb.

At each end of the outer wheel hub forces are exerted forming a couple caused by the side thrust, and equal to 35,205 lb. Lay off to any convenient scale the various forces, $ab = 18,370$ lb., $bc = 35,205$ lb., $cd = 35,205$ lb., $de = 1200$ lb. (motor), $ef = 700$ lb. (axle), $fg = 1200$ lb. (motor), $gh = 300$ lb. (gear), $hj = 450$ lb. (wheel), $jk = 4330$ lb.

Assume the pole P any convenient distance, taken in the figure as 30,000 lb., to the same scale as the forces ab , bc , etc., and draw the rays Pa , Pb , Pc , etc. Then through any point A on the line of direction of the force J_1 draw AB and AJ parallel respectively to Pa and Pb and JI , IH , HG , GF , FE , ED , DC and CB parallel to the other rays. If the work is done correctly the intersection of AB and CB will be on the line BD . The vertical intercept of the sides of the equilibrium polygon, measured in inches, to the same scale as the drawing of the axle, multiplied by the pole distance, 30,000 lb., gives the bending moment, in inch-pounds in the axle at that section. From these bending moments and the known section moduli at the various sections, equal to $0.098 d^3$, the stresses at the different points are calculated in pounds per square inch, laid off to any convenient scale vertically from the line MN , Fig. 2, and the stress diagram is drawn in.

It is at once seen that the point of maximum stress is at the inner end of the wheel hub on the commutator side, and that its value is 17,654 lb. per square inch. As before stated, the assumption of centrifugal force taken would require an excessive speed on a perfect curve to produce. But when it is remembered that this force is the product of the mass and the sidewise acceleration, and that switch points and curves are far from perfect and therefore induce exceedingly high rates of side acceleration, it will be seen that the conditions are not improbable.

In the next article of this series we shall discuss the merits of the axle analyzed herein to show how it might be improved by application of the theory outlined. A modified axle, with fiber stresses determined by the same method, will be described also. In the concluding article the materials available for use in axles and the care and treatment of axles, will be taken up.

New Passenger Locomotive for the St. Paul

Center of Gravity Is 63 In. Above Rail, One-Hour Rating 4000 Hp., and Starting Tractive Effort 112,000 Lb.

THE Westinghouse Electric & Manufacturing Company and the Baldwin Locomotive Works have under construction for passenger service on the Chicago, Milwaukee & St. Paul Railway ten direct-current, regenerating locomotives. These form part of the electrification extension described in the issue of the *ELECTRIC RAILWAY JOURNAL* for Nov. 3, 1917, page 819.

MECHANICAL FEATURES OF THE LOCOMOTIVE

The complete locomotive, with a total length over couplings of 90 ft., weighs ready for service 266 tons, and has an adhesive weight of 330,000 lb. The single cab is carried on the two main running gears, each having a four-wheel guiding truck, three driving axles in a 16-ft. 9-in. rigid wheelbase, and a two-wheel trailing truck. It thus corresponds to two Pacific-type running

The four-wheel guiding truck center pin and cross-equalized leading pair of driving wheels are equalized together on the longitudinal center line of the locomotive. This arrangement combines the advantages of the standard front and construction of the "American" and "Consolidation" types of steam locomotives. The remaining two pairs of driving wheels and the two trailing wheels of the main running gear are side-equalized together again, following accepted steam-locomotive practice. The method of equalization used here provides a weight variation on the driving wheels of only 6 per cent from normal when the locomotive is pulling at 30 per cent adhesion.

The center of gravity of the main running gear, including motors, is 41½ in. above the rail, and the height of the center of gravity of the complete locomotive is 63 in. above the rail.

The designers of this locomotive point out as salient features the following: Large capacity in single-cab unit; flexibility of running speeds with small rheostatic losses; twin-motor design with quill drive; low-voltage auxiliaries simplifying inspection, maintenance and



NEW LOCOMOTIVE FOR PASSENGER SERVICE ON CHICAGO, MILWAUKEE & ST. PAUL RAILWAY

gears coupled with a link and having the two-wheel trucks on the adjacent ends.

The main running gear center pins are located midway between the first and second driving axles of each running gear. On one running gear the center pin is designed to restrain the cab both longitudinally and laterally, while on the other the center pin restrains the cab only laterally, permitting free longitudinal movement. This arrangement of riding and floating pins relieves the cab of pulling and buffing strains due to train load, as these strains are taken directly through the running gear side frames and bumpers. The driving wheels are 68 in. in diameter, and carry 55,000 lb. per axle. The guiding trucks have 36-in. wheels, while each two-wheel truck has a load of 38,500 lb. at the rail, with approximately 62,000 lb. distributed on each of the four-wheel trucks.

On any single driving wheel, the non-spring supported weight is that of wheels, axles and driving boxes only.

The flexible type of quill drive is used to afford a means of permitting a motor located well above the roadbed to drive an axle which, with its wheels, is free to follow the rail independently. This drive secures all the advantages of a flexible gear in cushioning the transmittal of torque and minimizes the road shock.

Each main running gear has three-point equalization with a single point toward the end of the locomotive, in accordance with accepted steam-locomotive practice.

operation; simple and effective regeneration; improved equalization to minimize weight transfer in trucks; auxiliary train-heating plant.

One of these locomotive units is capable of hauling a 950-ton train (twelve coaches) over the entire mountain section at the same speeds as called for by the present schedules. The one-hour rating is 4000 hp. and the continuous rating is 3200 hp. with a starting tractive effort of 112,000 lb. The normal speed on level track is 60 m.p.h., and on a 2 per cent grade a speed of about 25 m.p.h. is maintained.

MOTORS, CONTROL AND AUXILIARIES

Flexibility of speed control is obtained by the use of nine running positions without rheostatic loss. The six 1500-volt twin motors on one unit are connected for three-speed combinations as follows: One set of six motors in series, two sets of three motors each in series, and three sets of two motors each in series.

Two additional running speeds are obtained on each speed combination by means of inductive shunts on the main motor fields, which assist in cutting down current peaks, as well as save rheostatic losses. The speed range is from 8 to 56 m.p.h., depending on the load.

The use of the twin-motor design with quill drive permits effective use of the space between the driving wheels, and the use of two armatures, each wound for 750 volts direct current, geared to the same quill. This voltage is preferred to 1500 on account of the better

Electrical Properties of Vulcanized Fiber

Effect of Temperature, Thickness and Color on Breakdown Voltage—Physical and Chemical Properties—General Uses

BY WILLIAM EVES, 3D

Engineering Department American Vulcanized Fiber Company

CONSIDERABLE work has been done in the measurement of the electrical properties of vulcanized fiber, but not very much of the information that has been obtained on the subject has been collected. Breakdown voltage is by far the most important electrical property concerning which information is required by the user as it is considered in 98 per cent of the cases.

BREAKDOWN VOLTAGE

The breakdown voltage per unit of thickness of vulcanized fiber is a function of the thickness itself, the extent to which the gelatinization of the individual piles of paper has been carried, the temperature of the sample at the time of the test and to some degree the color.

Moisture to a certain degree is necessary for the life of vulcanized fiber and any zinc chloride used as the gelatinizing agent that remains after the washing processes will be in solution in the natural moisture. This may happen in spots at which points leakage would occur between the electrodes of the testing set. Local heating would result, reducing the resistance of the small amount of solution, and breakdown would

(Concluded from page 237)

commutating characteristics inherent in motors built for the lower voltage.

The only high voltage apparatus among the auxiliaries on the locomotive is the motor of the small motor-generator which is used for train lighting and charging the storage battery. Low-voltage auxiliaries were adopted to secure minimum complication of installation, maintenance and operation. Ordinary inspection can be carried on, including the functioning of switches and auxiliaries, with no 3000-volt power on the locomotive.

The regenerative control in these locomotives has been designed to secure positive operation of this feature over widely varying speeds. The same main motor combinations for "motoring" are used for "regenerating," except that the fields of the main motors are separately excited over a wide range by means of axle-driven generators. These are so connected with balancing resistance as to insure inherent stability in the motor characteristics during regeneration.

These machines are mounted on the pony trucks of the locomotive and, in addition to exciting the motors during regeneration, furnish power for operating the air compressors and blower motors when the locomotive is hauling. This arrangement insures a supply of current to the air compressor motors irrespective of the overhead trolley supply, and provides that compressed air will always be available for use of the air brakes.

Each locomotive is equipped with an oil-fired steam boiler, designed to burn the ordinary fuel oil used by the railway company. Provision is made for a storage of 7500 gal. of water and 750 gal. of oil in each engine.

occur before the breakdown voltage of perfect fiber was reached.

The method and conditions of the test will also affect the voltage at which the sample will break down. The shape of the electrodes will affect the distribution of the electrostatic flux throughout the material, and the medium in which the terminals are immersed, oil or air, and the rate of application and the method of application of the voltage will determine the amount of heating due to corona loss, causing consequent drying and carbonization and premature breakdown.

CURVES SHOWING EFFECT OF TEMPERATURE AND THICKNESS

The accompanying curves were plotted from test data obtained at the Massachusetts Institute of Technology by Katzenstein and Burt. In all, 4000 tests were made, including red, black and gray fiber, but it has been considered advisable to reproduce here only the temperature curves for gray fiber. The tests were

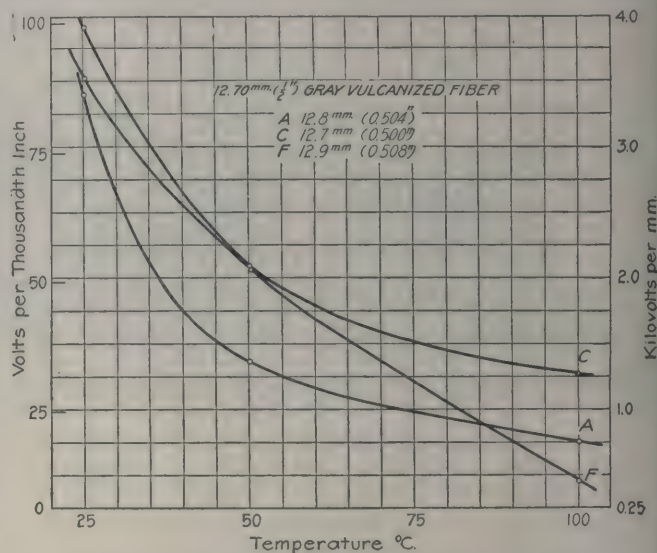


FIG. 1—BREAKDOWN VOLTAGE OF 1/2-IN. GRAY VULCANIZED FIBER

all made with the same electrodes, and the voltage was increased at the constant rate of 1000 volts per second. At temperatures higher than room temperature the samples were prepared by heating in an oven for one hour for the thinner specimens and from four to five hours for the thicker.

SOME OBSERVATIONS MADE IN THE INVESTIGATION

Fig. 1, referring to gray fiber of 1/2 in. thickness shows an average decrease in breakdown voltage in the 25 deg. to 100 deg. temperature range, of 77 per cent. Tests on a thickness of 0.03 in. show an increase of 80 per cent in breakdown voltage for the same range of temperature. Tests on thickness greater than 1/2 in. are not very interesting, because the voltage required to break down a sample of such thickness is greater than most commercial voltages.

A comparison of results on black fiber of 0.067 in. thickness shows on average increase of 12 per cent in breakdown voltage. Greater thicknesses show a decrease with increase in temperature.

The results of tests with red fiber of 1/4 in. thickness show the average decrease in breakdown voltage in the range from 25 deg. to 100 deg. to be approximately

60 per cent. Thin red fiber shows an average increase in breakdown voltage from 25 deg. to 100 deg. of approximately 20 per cent.

The most plausible theory for the change from an increasing variable with increasing temperature to a decreasing variable with increasing temperature but with an increase in thickness, is that the small amount of moisture and zinc chloride in solution cause the resistivity to decrease with increase in temperature, while the fiber loses a certain amount of its contained moisture when heated, greater thicknesses doing so much less rapidly than lesser thicknesses, but not at all in proportion to the thickness.

The results of many tests made with the fiber of five large manufacturers have been averaged, and the composite results are shown in Fig. 2. This curve gives values for room temperature only.

BREAKDOWN VOLTAGES* OF SEVERAL THICKNESSES OF VULCANIZED FIBER	
Thickness in Inches	Breakdown Value, Volts per 0.001 in.
1/32	225 to 425
1/16	150 to 300
1/8	125 to 275
1/4	100 to 225
1/2	75 to 150

*Results higher than these have frequently been observed, but these limits will include the majority of cases.

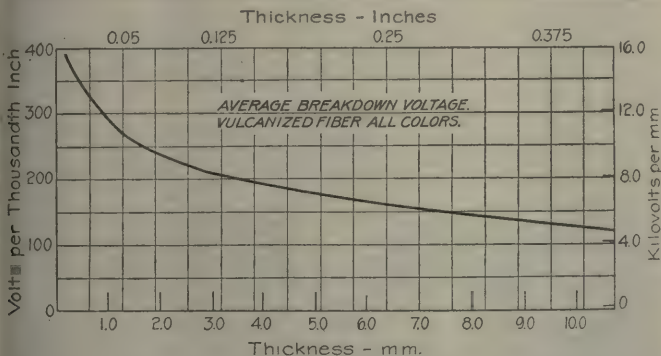


FIG. 2—AVERAGE BREAKDOWN VOLTAGE OF VULCANIZED FIBER OF ALL COLORS

Gray fiber is made from paper of the natural color, with no coloring matter of any kind. Black contains a small amount of lamp black or other coloring matter, and red is colored with a relatively large amount of various grades of oxide of iron. Any loading material placed in the paper from which vulcanized fiber is made tends to interfere to some extent with the chemical treatment, and the result is a less homogeneous material. Coloring matter acts as a loading material and produces a slightly more "papery" fiber, which usually has a higher breakdown value because of the greater degree of lamination. Moreover, fiber is made from three grades of paper, which vary in the degree to which they are gelatinized by the chemical action. The paper from which 1/8 in. to 3/4 in. fiber is made is treated to the greatest extent with the zinc chloride, and consequently a more homogeneous material with low breakdown voltage results. In a large number of cases the loading factor of red fiber is so much more pronounced than the tendency for the small amount of solution of oxide of iron to lower the breakdown voltage that the dielectric strength of red fiber will be higher than that of gray fiber. Black fiber is usually between the red and gray grades and nearer the gray in its breakdown voltage.

As vulcanized fiber loses its normal amount of contained moisture its pliability decreases and finally it becomes brittle. This is caused either by application of a sustained temperature of 80 deg. to 100 deg. cent. (176 deg. to 212 deg. fahr.) or to higher temperatures up to 200 deg. cent. (392 deg. fahr.) for shorter periods of time. At this latter temperature charring commences. It has the following strengths in pounds per square inch: Tensile, 9000-13,000; compressive, 33,000-43,000; shearing, 9000-13,000.

Vulcanized fiber is not waterproof. It absorbs water to a certain degree, but is not injured by either hot or cold water, for it returns to its original dimensions and properties when dried. Most dilute acids and alkalis cause no effect other than the effect of water, but concentrated acids cause disintegration. However, organic solvents and all oils have absolutely no effect and are not absorbed in the slightest degree.

GENERAL USES FOR ELECTRICAL INSULATION

Vulcanized fiber was first used in 1873 for axle washers and railway car-journal dust guards. One of the largest uses at the present time, either for electrical or mechanical purposes, is for railway signal insulation. The rail joints opposite every block signal must be insulated in order that the rails may be used as the signal circuit. The ends of the rails are insulated by means of fiber end posts and a fiber head plate and base plate with bushings around the bolts are used to insulate the fish plate from the rail. Every spur must have an insulated joint where it leaves the main track, and every switch rod and steel tie and all metal parts that connect the two rails electrically must be insulated. The specifications for this application are quite severe.* This is an instance where the material is subject to severe weather conditions and extreme mechanical strain, and yet the dielectric strength must be high even when it contains a fairly high percentage of moisture.

When the breakdown voltage per thousandth of an inch, the specific gravity and the cost per pound of vulcanized fiber are compared with the corresponding values for other insulating materials, it will be found that the commercial insulation value of vulcanized fiber is very high. Its ability to be machined with great accuracy and to be bent, punched and formed to shape should be taken into account. In fact, it can be used in many cases where no other material will answer.

Circulating Water in Car Heaters

It has been found at the carhouses of the Ohio Electric Railway, Columbus, Ohio, that the difficulty of starting the water to circulate in the pipes of hot-water car heaters can be overcome by putting the car in motion. To this end the car is sometimes run for short distances and stopped suddenly each time. A small motor-driven centrifugal pump has also been installed on some cars for the same purpose. The experience of this company in the use of car heaters of this type was related in some detail by F. J. Foote, master mechanic, in an article in the ELECTRIC RAILWAY JOURNAL for March 3, 1917, page 397.

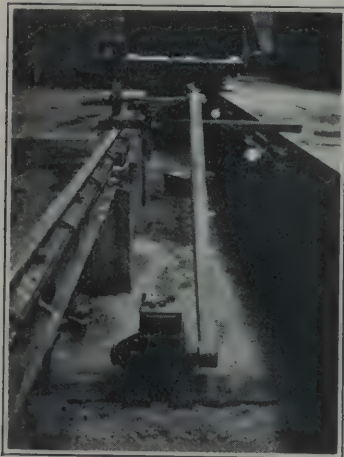
*See standard specifications of Railway Signal Association.

Quick Method of Grinding Wheels

By J. F. MERRICK

Master Mechanic Oakwood Street Railway, Dayton, Ohio

WE HAVE on our system approximately a mile of track with an average gradient of about 6 per cent, the maximum being 8.5 per cent, and the braking required on this section subjects the wheels to very severe tests, making flat spots not uncommon, especially on cast wheels. Turning the wheels true both reduces the wearing capacity and requires considerable time, and although emery shoes would remove the flat, it would take, in most cases, two or three days.



APPARATUS FOR GRINDING WHEELS AT THE PIT

To obviate these difficulties we designed an apparatus both for grinding the wheels and for truing up the flanges, as shown in the accompanying illustration. The grinder consists of an emery wheel

and a pulley on opposite ends of a shaft, mounted on a 6-in. x 8-in. timber. This is laid across the track under the car, and bolted down, and power is supplied by a track-grinder motor which is set in the pit. The car is jacked up, and the proper car motor is operated to turn the defective wheel, while the remaining motors are cut out. The emery wheel has a feeding mechanism operated by a ball handle similar to that of a lathe tool.

With this method it is possible to grind a wheel during the time it would take to prepare it for turning in a lathe. By providing two emery wheels, with the pulley in the middle, two wheels can be ground simultaneously, thus saving more time and making the work on both more nearly the same.

Protecting Signs Used in Rochester

A CONVENIENT and substantial danger sign used by the New York State Railways, Rochester, N. Y., is shown in Fig. 1. It consists essentially of an iron framework supporting the signboard, which is about 2

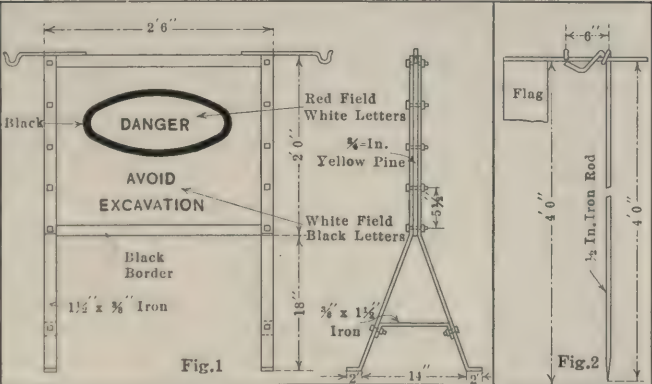


FIG. 1—DANGER SIGN USED IN ROCHESTER. FIG. 2—FLAGSTAFF USED ON INTERURBAN LINES

ft. square and upon both sides of which the sign is painted in different color combinations. Two hooks, screwed to the top of the board, provide places for hanging lanterns.

This sign is used almost exclusively throughout the city to protect track gangs and material and also in place of regular "Street Closed" horses. While it is impossible to give any data as to the effect its use has had on the prevention of accidents, it is considered well worth its cost, since the ease with which it is transported adapts it especially to repair and construction work on city streets. The cost of this sign in the early part of last year was \$6.

During construction work on its interurban lines the company uses the standard flagstaff shown in Fig. 2. This is used also with a yellow flag or a yellow light when work requiring low-speed operation is in progress. It is also easily shifted from place to place.

Effective Snowplow Equipment for Interurban Roads

THE Bamberger Electric Railroad, Salt Lake, Utah, has built in its shops some interesting snowplows to be used in keeping track open during drifting snow.

Fig. 1 shows the type of plow as applied to the standard motor car equipment of this company. Note that the wings of the plow are so curved as to give the snow

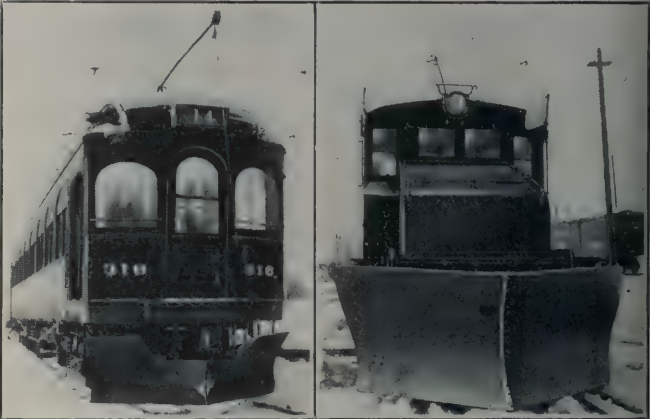


FIG. 1—TYPE OF SNOWPLOW USED ON MOTOR CARS. FIG. 2—SNOWPLOW EQUIPMENT FOR USE ON LOCOMOTIVES

a rotary motion, throwing it entirely clear of the track. This makes a channel wide enough to clear the journal boxes, rear steps and other parts of the car. The plow is fastened to the wooden pilot which has been effectively braced to the main body frame of the car. As shown in the figure, the construction is such that the cars can be coupled in trains, space having been left to allow free action of radial drawbars.

It is stated that motor cars carrying this plow seem to make better speed and pull less heavily on the substations than cars not so equipped.

In Fig. 2 is seen a similar type of plow built for the locomotives. This plow has been made entirely of scrap 1/4-in. sheet steel heavily reinforced and mounted on a steel frame. Sixty-five pound steel rails, bent at right angles, are attached to the locomotive frame, and on these are mounted two air cylinders for raising the plow from an operating position of 1-in. clearance to a carrying position of 6-in. clearance above the top

Pay-as-You-Leave One-Man Car at Plymouth, Mass.

THE Brockton & Plymouth Street Railway is operating two pay-as-you-leave one-man cars upon that part of its line between the Hotel Pilgrim, in Plymouth, Mass., and the Kingston town line, a distance of about 10 miles. This mileage is divided into three overlapping zones as shown in Fig. 1. The fare unit for the whole or any part of a single zone is 6 cents,

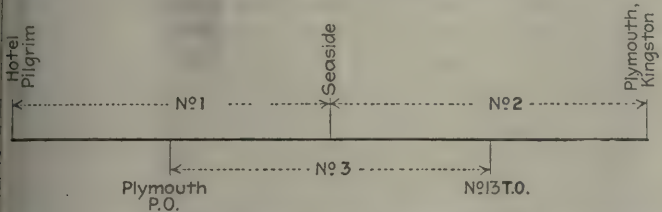


FIG. 1—OVERLAPPING FARE ZONES, BROCKTON & PLYMOUTH STREET RAILWAY

and for the entire line between the above-mentioned terminals, 12 cents. Fares are paid either in cash or with tickets which may be purchased in advance.

Upon entering the car, which is shown in Fig. 2, each passenger is given a metal identification check, Fig. 3. These checks are of three designs, square, octagonal and circular. Each represents one of the three fare zones and is stamped accordingly. Before leaving the car the passenger in each case returns his check to the operator and is told the amount of his



FIG. 2—SAFETY PAY-AS-YOU-LEAVE CAR, BROCKTON & PLYMOUTH STREET RAILWAY

(Concluded from page 240)

of the rail. This operation is controlled by a simple valve at the motorman's position.

As in Fig. 1, it will be noted that the plow has been so shaped as to give the snow a rotary motion that at a fair rate of speed deposits it clear of the second track. The plow is mounted in front of the pilot and is readily attached to the locomotive. This operation comprises the application of twelve bolts to connect the holder rails to the frame and eight bolts for the brace rod between the holder rails and the frame.

The two holes shown in the front of the plow were cut to permit the passage of a chain to the coupler in case it should be desirable to use the locomotive for wrecking purposes with the plow attached. The locomotive weighs approximately 40 tons and the plow an additional 1250 lb.

fare. This he deposits in one of two compartments of a C-16 International fare box, arranged for both ticket and coin service. The slot for tickets will not admit a coin or identification check, and the circular openings in the coin receiver are too small to admit a ticket or a check. The tickets are mutilated as they pass through the box. Coins (cents, nickels and dimes) are held visible to the operator in the coin receiver until released by him. They then pass automatically through an adding machine showing the total value of

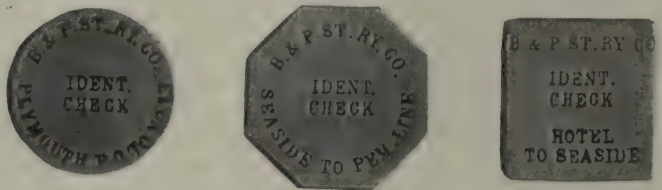


FIG. 3—METAL IDENTIFICATION CHECKS, BROCKTON & PLYMOUTH STREET RAILWAY

fares collected at any time. The coins are then removed by the operator and used over and over in change-making.

No transfers are given in connection with the operation of these one-man, or safety cars, as the Stone & Webster organization, managing the road, designate them, but school children are carried at half fare, in accordance with the Massachusetts law. The cars were built by the St. Louis Car Company. They are each equipped with two GE-258 motors, safety controller handle, automatic door, step, braking, sanding and unlocking door equipment along the usual lines of design applying to this type of rolling stock. Besides the controller contact which must be held in position in order to operate the car, a pedal switch is provided in each car to relieve the operator of the inconvenience of constantly holding his hand upon the control. An average service of 180 car-miles per day is performed by each of these cars.

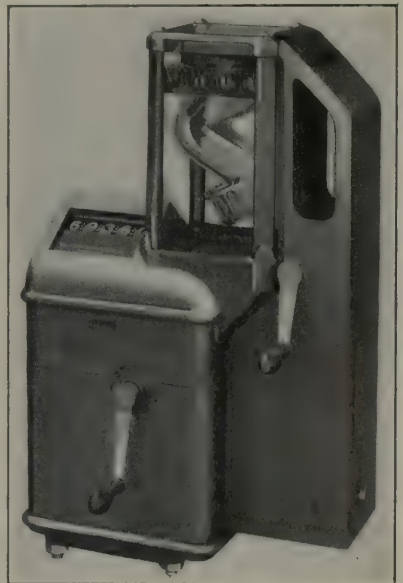


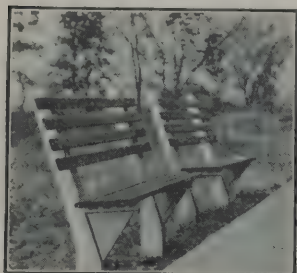
FIG. 4—FARE BOX USED ON ONE-MAN CARS

Rate of Bituminous Increased-Production Better This Year

The increase in bituminous coal production in 1917 over 1916 was 8.3 per cent in place of the expected 10 per cent. The increase was 23 per cent over 1915. The year 1918 has started off with an average per working day of 1,799,000 tons, an increase of 1¼ per cent over the average for 1917.

Concrete Makes Good Benches for Interurban Shelters and Parks

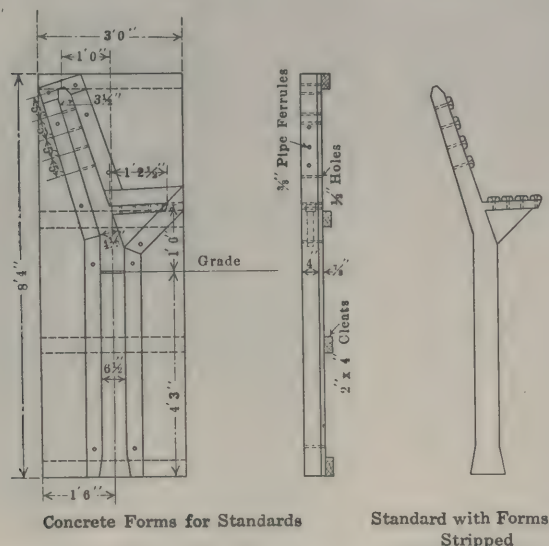
ELECTRIC railways are often called upon to provide outdoor benches at waiting shelters along interurban lines and in company-owned parks. As these benches get rough usage it is desirable to make them as rugged as possible and at the same time they should present an attractive appearance.



ATTRACTIVE BENCHES MADE OF CONCRETE

A concrete bench which meets these requirements and one which can be readily made by the railway's own men is shown in the illustrations. The forms for the concrete are made of 4-in. planks which are bolted to a baseboard from which they are removed as soon as possible

after the concrete has set. The concrete is a 1:1:2 mixture, the coarse aggregate consisting of $\frac{3}{4}$ -in. washed gravel. Four $\frac{1}{4}$ -in. square rods 8 ft. long and twisted are used in each of the standards, and two rods of the same cross-section but 1 ft. 4 in. long are placed in the brackets underneath the seat. The standards are



DETAILS OF FORMS FOR MAKING CONCRETE BENCH

set 4 ft. apart and 4 ft. 3 in. in the ground. It is reported that benches of this type which have been in service for more than a year have caused no trouble from breaking or from heaving.

The cost of making and installing the benches is about \$8.75 complete.

Coasting 1581 Miles More Per Day

In the latest issue of the *B. R. T. Monthly*, William Siebert, superintendent of surface transportation, points out that the schedules on the Brooklyn Rapid Transit system call for 33,400 trips per day. If each motorman on each trip would coast an additional 250 ft. it would mean a daily saving in power consumed equal to the amount of power it would take to operate a car 8,350,000 ft., or 1581 miles. From five to ten times this amount could easily be saved.

Precautions that Prevent Freezing in Air Piping

THE large number of air-operated mechanisms used on railway equipment make it necessary to take great precaution in the installation of the air-piping between the compressor and the main reservoirs to prevent freezing of the condensed moisture. This is especially true of pneumatically operated apparatus which employs valves with small openings. The January issue of the *Electric Journal* tells of some important parts that should receive careful attention.

Contrary to a general impression, freezing at very low temperature is not so troublesome as it is a little below 32 deg. Fahr. because at low temperature most of the moisture has been frozen out of the atmosphere. The installation of air piping should be such that the maximum amount of moisture is retained in the main reservoir and no pockets should exist where moisture is liable to collect. The pipe between the compressor and the main reservoir, as well as the pipe between the two main reservoirs, should be at least 25 ft. long, and when the length of car does not permit a straight run the pipe should be made in the form of horizontal coils.

A scheme which is similar to the pipe coil, but having the additional advantage of multiple paths, is the arrangement of a number of tubes fastened into two heads or drums. One of these drums can be used as a moisture trap, preventing the major portion of the moisture from getting into the main reservoir. For a given length of piping with the same diameter in the two systems one arranged in the single path and the other in multiple paths, the single path will require a greater velocity and hence a greater loss in pressure for the delivery of a given quantity of air.

In connecting the feed pipe to the reservoir particular attention should be given to make sure that the connections do not give a reduction of pipe area at any point, as the change in area increases the possibility of freezing. One of the most common breaches in the proper method of making an air installation is to use an "L" fitting at this joint, which not only gives a reduction of area but forms a trap for moisture to accumulate. A better and much more satisfactory scheme for this connection is to have a straight run or large radius bend to the main reservoir where possible and use a connector which does not give a reduction in area.

All piping from the reservoir to the various pieces of apparatus should be arranged to drain back into the reservoir as far as possible, and when this is impossible it should at least drain away from the apparatus.

There have been a number of installations where the compressor intake has been mounted inside and, in some cases underneath, the car. The best place to mount the intake is on the roof, as it is then possible to obtain cool, clean air. More moisture is obtained from the interior of a car than from the exterior, especially on a cold day, because the higher temperature of the air within the car permits the presence of more moisture per unit volume of air.

Even with the best installations it is impossible to prevent considerable moisture from getting into the system and to prevent trouble from this source a rigid inspection should be maintained during the winter. It is a good practice to drain the main reservoir at least once a day and oftener if possible.

Recent Happenings in Great Britain

Coal Saving, Labor Shortage, Package Delivery and Other Matters Growing Out of the War Are Main Topics to Receive Attention

(From Our Regular Correspondent.)

The coal conservation sub-committee has issued an interim report to the Ministry of Reconstruction regarding electrical power supply in Great Britain. The sub-committee proposes, briefly, to supply all industries with energy generated at big "super-power" stations, not more than sixteen in number for the whole country, and to eliminate or combine all smaller stations. The primary object of the scheme is to economize coal supplies. The amount of coal used in the United Kingdom for the production of power is 80,000,000 tons at a cost of about £40,000,000 at the pit head. By an up-to-date and national scheme of electrification 55,000,000 tons of this, valued at £27,000,000 a year, could be saved. This, with a saving of the by-products now wasted by the burning of coal in open grates and boiler furnaces, would effect a national economy of £100,000,000. The generating machines in the stations should be of large size, not less than 20,000 hp. each. In more important industrial districts machines of as much as 50,000 hp. might be used to even greater advantage. At the present time the supply of electricity in Great Britain was split up among about 600 companies and municipal undertakings. The average generating capacity of such of these undertakings as possessed power stations was only 5000 hp., or about one-fourth of the capacity of one single generating machine of economical size and about one-thirtieth of that of a power station of economical size. The committee favored private enterprise. The sixteen great power authorities, whether private companies or public bodies, would be controlled by a national board of electricity commissioners. Existing plants would be handed over on equitable terms to the new authority.

YOUTHS AS DRIVERS

The Board of Trade inquiry into the recent tramcar accident in Glasgow has elicited some interesting information as to the conduct of tramways in war time. The car in question was being driven by a lad about sixteen years of age. It took the corner at Queen's Park gate at very high speed and was overturned. As a result three persons were killed and about fifty others were injured. Colonel Pringle, who conducted the inquiry, elicited from the chief instructor in the tramways motor school the information that in tramway service youths stood the cold better than women, and were less emotional and excitable. It was contended that a boy of sixteen was as strong as a woman of twenty-five. The traffic manager stated that in ordinary times the department did not employ men under twenty-one years of age, but owing to the fact that about 3000 of the staff were absent in the army it had become

necessary to employ youths or women. The traffic manager stated that women were not efficient drivers as a rule. Of 800 women trained in Glasgow for such work, only 258 had been retained. Three months ago the department started the experiment of training lads of sixteen and upwards, and at present the corporation had 146 under age, of whom thirty-nine were qualified as motormen, fifty-one were training, and fifty-six were conducting. There were disadvantages in the employment of these youths, but if the corporation did not utilize them, cars would have to be taken off. This would be a serious matter in important munition centers.

INCREASE IN STAFF PROPOSED

At a recent meeting of the London County Council the highways committee submitted proposals for the appointment of an assistant electrical engineer and for the settlement of details of reorganization not covered by the main scheme approved in February. The proposals included increase of the fixed staff of the tramways department. Including the appointment of an assistant electrical engineer, indicated in the main report, the estimated additional expenditure involved by the proposals in the report is £1,655 and ultimately £2,905 a year. The committee is satisfied that economies in working costs will outweigh the additional expenditure which is proposed for the staff.

By a new defense of the realm regulation, the Board of Trade, for the purpose of making the most efficient use of the materials or plant belonging to a tramway or light railway undertaking with a view to the successful prosecution of the war, may by order require the whole or any part of the rolling stock, materials and plant, including permanent way, of any such undertaking to be placed at its disposal or at the disposal of any person or body of persons named by the board. Where any such order has been made, the board or any such person or body of persons may take possession of such portions of the rolling stock, materials or plant of such undertaking as may be required, and may remove them and make use of them for the purposes of any other tramway or light railway.

A large number of the Councils through whose districts the cars of the London United Tramways pass have decided to petition against the company's bill to increase fares, abandon parts of its lines, abolish wayleave payments and put off the time of purchase of the undertaking by local authorities.

It is of some interest to note the effect of the abolition of the halfpenny stages at Keighley. The tramways department had settled down to the halfpenny stage system for some time before the war. Keighley's short and compact tramway system lent itself

admirably to the halfpenny arrangement. The cases of crowding out longer distance passengers were comparatively few. With the increased running costs due to the war it was found impossible to make the halfpenny fares pay. Recourse was had first of all to a twenty-for-a-shilling prepaid ticket system. Later on the corporation adopted penny fares for all stages. For a time the number of passengers registered showed a marked drop from the halfpenny totals. Now the passenger records are mounting again. The totals for the last four weeks for which figures were available show an advance of £153 over those for the corresponding period of the previous year. The Town Council has sanctioned an advance in fares by the trackless trolleys to meet the increased running charges.

CO-ORDINATE ROAD TRAFFIC

The Leeds tramways committee has been asked by the government department responsible for the co-ordination of road transport if it cannot make more use of the cars for the conveyance of parcels. A similar communication has been sent to the tramway undertakings in many other cities. One of the exceptions is Bradford, which has taken the lead in the matter of package handling. Road transport offers a wide field for the exercise of various economies—economy in man-power, petrol, fodder, etc. Three or four tradesmen's vans delivering goods on the same day in the same locality represent a waste which in these times it is most desirable to avoid, and this departmental activity is aimed at concentrating into one organization the entire parcel delivery system in any given district.

No cheaper method than the use of the trams could be devised for this purpose. It is interesting to know that the system is in operation in Bradford to such an extent that the parcels department is handling, apart from newspapers and milk from the municipal depot, between 9000 and 10,000 parcels a week.

The Halifax Tramways committee has decided to ask the Town Council to sanction an all-round increase of 50 per cent in tramway fares. The recommendation is made because of the growing difficulties of maintaining the present services in consequence of reduced staff and material and the increased cost of repairs, renewals and labor. It is also necessary to put a stop to overcrowding on the cars.

The question of municipal tramways was mentioned at a recent meeting of the Grimsby Corporation highways committee. It was reported that the lease of the tramway company would expire in 1921, and it was decided to appoint a special committee to consider the question of acquiring the undertaking. This committee will be authorized to make investigations, collate information, and to engage such advice as may be necessary to enable it to present a complete report to the Town Council.

A. C. S.

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

Forty-eight Cars Burned

Damage at Buffalo Not as Great as at First Reported, But Will Total \$500,000

Fire which swept through the Forest Avenue station of the International Railway, Buffalo, N. Y., on the night of Jan. 23 destroyed forty-eight cars and four snowplows and track sweepers. Twelve other cars were slightly damaged. The loss is estimated at \$500,000. The burned cars will be replaced immediately, but the company will probably move the location of the carhouse. Investigations made by the railroad officials failed to determine the cause of the fire.

After conferences with the J. G. Brill Company, Philadelphia, that company promised to divert to Buffalo thirty cars now being built for other companies. These cars are of the double-end type similar to those destroyed in the fire. The company has received twelve cars from the G. C. Kuhlman Car Company, Cleveland, Ohio, on its second order for fifty cars and the other thirty-eight cars will be delivered within the next sixty days.

The Forest carhouse was one of the oldest owned by the company. It was a one-story brick structure 500 ft. x 150 ft. About eighty cars were operated out of it, but fifteen cars were lying on storage tracks on property adjoining the station on the night of the fire and the balance were being operated on the three lines which run out of the burned structure.

Within thirty minutes after the fire was discovered the entire building was in ruins. As soon as the power had been cut off at the power houses the firemen started to throw water onto the building, but it was fully fifteen minutes before this was done. The frame roof fell onto the cars and every car in the house was destroyed beyond repair.

About half of the burned cars were of the double-end type. The others were near-side pay-as-you-enter cars. None of the company's new equipment was operated out of this carhouse. The loss of this equipment will seriously

handicap the company until all the cars can be replaced. From the Forest carhouse are operated all the cars for the Elmwood Avenue line, which is the main traffic artery to the Pierce-Arrow Motor Car Company, the Curtiss Aeroplane Company, and other large war industries in the congested Elmwood-Hertel Avenue section. Cars have been diverted from several of the company's other carhouses to handle a large part of this traffic.

E. G. Connette, president of the International Railway, has not decided whether the Forest station will be rebuilt. The company owns the property, which is located in a valuable residential section with a long frontage on Richmond Avenue, a popular residential street. The company is considering the purchase of property in the Elmwood-Hertel section for a new carhouse. This



ALL THAT REMAINS OF THE FOREST AVENUE STATION

proposed site would be of great value to the company because it would be in the center of a rapidly growing industrial section.

The rolling stock equipment of the company as last reported consisted of 945 motor cars and ninety-three other cars. The company operates about 400 miles of electric railway.

Manila Officials Return

J. H. Pardee, president, and J. P. Ripley, railway engineer, the J. G. White Management Corporation, New York, N. Y., who have been making a general inspection of the Manila Electric Railroad & Light Corporation and other interests in the Islands operated by the Management Corporation, have returned to this country.

Franchise Approved

St. Louis Settlement Grant Goes to Public Service Board Before Final Action by City

The bill providing for the settlement of the differences between the United Railways, St. Louis, Mo., and the city was approved by the Board of Aldermen on Jan. 18 by a vote of twenty-four to five, and sent to the Public Service Board, which must submit a report on the franchise measure under a provision of the city charter before final action is taken by the Aldermen. Under the charter the Aldermen are not bound to accept any amendment suggested by the Service Board. They are merely required to receive a report from that body before acting finally, in order not to pass on franchise legislation without expert engineering advice.

The bill was approved with amendments agreed upon by the public utilities committee, on motion of Alderman Barney L. Schwartz, chairman of the committee. Alderman Hall objected to approving the amendments before the Service Board acted, but his motion to send the bill to the Service Board without amendments was lost.

The bill extends the franchise of the United Railways thirty years, and substitutes a special tax of 3

per cent on gross revenues for the mill tax and special franchise taxes. It creates a board of control with power to order extensions and betterments of service whenever the company can afford the investment. The city will recognize the company's right to earn 6 per cent on a valuation of \$60,000,000, and all earnings above 7 per cent will be turned into a fund which the board of control may use for building extensions or providing improvements in service, or for reducing the capital stock of \$60,000,000. Extensions or rolling stock purchased out of such surplus are to belong to the city, and the company is not to be permitted to earn profits on this investment. The accrued mill tax of \$2,300,000 is to be paid within five years and the company is to pay 6 per

cent interest on all of the deferred payments.

The Service Board took up the measure for the first time on Jan. 22 and decided to hold daily meetings until the measure has been fully considered. President Kinsey said the board would not be able to reach a report when the Aldermen hold their next meeting, but that it would probably be in a position to submit a report at the meeting on Feb. 1.

The board indicated on Jan. 22 that it may recommend an amendment to the settlement bill providing that whenever the earnings exceed 7 per cent on a valuation of \$60,000,000 the surplus may be used to reduce car fares. The present bill provides that surplus earnings may be used by the Board of Control in building extensions to the company's lines or in bettering the service.

Another amendment proposed on Jan. 22 was that the right of the city to condemn the property by a suit in the Circuit Court be stipulated in the settlement bill.

Strike on Municipal Railway

City Council Refuses to Bow to Threat of Coercion by Other Municipal Employees

The men in the employ of the Monroe (La.) Municipal Street Railway, operating 10 miles of line, went on strike on Dec. 26. This is the second strike of the employees of the municipal railway system in four months. The men claimed a "lockout" on the part of the city and failure of the city to live up to the contract between them and the city as interpreted by the arbitrators who settled the previous strike. Mayor Apgar said the "walkout" was due to the fact that there was not a sufficient number of men available to continue operation of the cars with two operatives on each car, and because the city refused to pay double time to the operatives for one-man operation. To the operators of the one-man cars the city had paid time and a half.

The city at once set about the task of finding men to replace those who had gone out, and in a few days was able to restore service practically to normal. Subsequently the City Council rejected a proposal by the executive committee of the Monroe Labor Council whereby the men who struck and the city would renew their contract and the men would return to work operating cars on the one-man plan, the wage scale to be the subject of subsequent agreement. This action reaffirmed the city's determination not to enter into another contract with the men. At the same meeting the Council ratified Mayor Apgar's action in hiring imported operatives and authorized the Mayor to hire at home or elsewhere not only additional men to operate cars but any men needed to operate other public utilities owned by the city. This authority was given in view of threats of a sympathetic strike which might tie up such utilities as the electric light plant and water works.

Two Estimates of Minneapolis Railway Values

Majority and Minority Reports Made by the Central Franchise Committee to the City Council Differ by \$5,809,572

The central franchise committee on Jan. 23 presented to the City Council of Minneapolis, Minn., its report of the valuation of the property of the Minneapolis Street Railway, controlled by the Twin City Rapid Transit Company. Two sets of figures were presented. Twenty-nine members of the committee signed a majority report that places the total value at \$21,279,932. Eighteen members signed a minority report that places the total value at \$15,470,360. Many qualifying or modifying considerations attach to the reports.

The majority report presents the figures as representing fair value proper to be used as a basis for a valuation of a new franchise for the company. It puts the physical valuation on Jan. 1, 1916, at \$18,868,130, including overhead charges, and the going concern value on Jan. 1, 1918, at \$2,411,802. The majority report is issued, its context states, subject to express provisions, one of which is that the \$2,411,802 allowed for going concern value on Jan. 1, 1918, shall be eliminated from capitalization at the rate of 2-11 a year, after Jan. 1, 1918, until a new franchise goes into effect.

The minority report, based upon the Cappelen and Pillsbury reports long precedent, criticises these reports and presents the figure \$15,470,360 as arrived at by taking the Cappelen physical valuation of \$21,152,221 and subtracting \$5,681,861, made up of items that the report says should be deducted. The minority report disagrees with the majority report in a number of important respects.

Each report presents analyses in detail of the various important items involved.

The company's franchise expires in 1923. Since the matter of a renewal of the grant came actively before the City Council several years ago, the following valuation reports have been made:

Date—By Whom	Valuation
Sept. 29, 1916—City Engineer F. W. Cappelen—Existent physical value Jan. 1, 1916.....	\$21,152,221
Cost to reproduce new.....	22,432,072
Including capital expended in development and commercial value of water-power leases (figures commonly referred to as representing the Cappelen report)	25,914,308
Including value of water-power leases to July 1, 1923, value of steam-property leases and value of downtown terminal block	28,789,085
Nov. 23, 1916—Street Railway Company	35,323,376
Dec. 22, 1916—C. J. Rockwood, attorney	19,107,607
Aug. 21, 1917—C. L. Pillsbury, engineer	24,300,000
Nov. 15, 1917—J. D. Hogarth, Milwaukee	13,608,730
Jan. 23, 1918—Central franchise committee, majority report..	21,279,932
Minority report.....	15,470,360

The minority report dissents from the majority report with reference to what it terms the "function of our committee to act as an arbiter," and says it has not conceived the committee to have such

function and that it does not desire to relieve the City Council of the duty imposed upon it of making an agreement with the railway.

DISAGREEMENT ON FUTURE PROCEDURE

The two reports differ widely in their suggestions as to what should be done next. The majority report says:

"In view of all considerations involved it will be to the best interest and welfare of the public of this city to secure a prompt settlement of the problem on the basis of valuation figures set forth."

The minority report disagrees with this and, after commenting on the statement that the stock of the company is widely distributed among men of influence in Minneapolis, says:

"The personnel of its officers is and has been in the past so closely related to those conducting large industrial and financial enterprises here, that sound business judgment dictates that a utility value from a board of national reputation and representing the people's point of view should advise the city as to what elements should be allowed in the final capitalization."

The reports have gone to the street railway committee, which will meet again at the call of the chairman to take up the matter.

Extension to Ballard Ready

Addition to Seattle Municipal Railway Will Be Placed in Operation This Month

Operation of the Seattle (Wash.) Municipal Railway, Division A into Ballard, over the Fifteenth Avenue N. W. bridge, is expected to begin during February. The opening of this extension will be the signal for the operation of municipal cars on Fourth Avenue as far as the County-City Building at Jefferson Street, by common-user agreement with the Seattle & Rainier Valley Railway. Because of the light construction of the Loyal Heights Railway, which has been taken over by the city, it will be impossible to operate the city's large cars over that line, so that between the County-City Building and the north terminus at Thirty-second Avenue N. W. and West Eighty-fifth Street there will be a transfer of passengers to and from large and small cars at West Sixty-seventh Street and Twenty-second Avenue N. W.

The City Council has concurred in the recommendation of the Public Utility Department that the agreement between the Loyal Railway and the Western Washington Power Company, which owns the Everett interurban, concerning the exchange of transfers, be continued in force. It has also been decided to permit the issuance of transfers between the city's Ballard line and the Loyal Heights unit, when it becomes city property, on 4-cent fares.

Temporary Agreement on Bay State Wages

Acute Situation Probably Relieved by Understanding Between Receiver and Representatives of the Men

The negotiations regarding wages that have been in progress between the officers of the Bay State Street Railway, Boston, Mass., and the representatives of the union of employees were terminated on Jan. 23. The men had requested an increase which would have cost the company about \$900,000 more a year than at present for wages. The company presented a co-operative plan for the consideration of the men. The contract under which the men are now working has until May, 1920, to run.

On Jan. 29 danger of a strike appeared averted by the reaching of an understanding between union representatives and the company relative to wage conditions during the present period of abnormal and reduced schedules resulting from the coal shortage. Conferences between Wallace B. Donham, receiver, and W. D. Mahon, of the Amalgamated Association, were concluded a few days ago, and it was expected on Jan. 29 that a formal agreement would shortly be signed which will remove all possibility of a strike. Up to the time of sending the *ELECTRIC RAILWAY JOURNAL* to press the details of the agreement had not been made public beyond the fact that it contained provision for wage increases dependent upon the co-operation of the men with the company's efforts to obtain increased efficiency of service. The temporary agreement will not invalidate the current agreement between the men and the company as to wages and working conditions in general.

A week after Mr. Donham became receiver, without any warning, the men took a strike vote, based on the necessity of the receiver shutting down part of the service on account of the coal shortage, notwithstanding the fact that the men were fully paid, under terms of the contract, whether they worked or not.

At the second conference arising out of this situation, Mr. Donham told the men that in his opinion this was not the real issue between the company and the men, but that they wanted increased wages. He told them further that he sympathized with their feeling, and they ought to have more wages, as prices had gone up since the war began. He told them, however, the Bay State Street Railway had no funds out of which it could pay any increased wages, but that the company was making an effort to work out plans under which it could get more money. It was explained in behalf of the company that it was impossible for it to meet the demands of the men.

Mr. Donham desired, however, to work out a method under which the men could get more money and he presented to them, over a series of conferences, a plan under which, with their co-operation in saving operating expenses the company could make sub-

stantial savings, most of which Mr. Donham was prepared to give to the men. As evidence of his good faith and belief that this savings plan would result in a real increase in the money received by them, Mr. Donham guaranteed, out of the share in the savings which would, under the plan, go to the company, to pay the men 1 cent an hour in addition to their contract wages. He further guaranteed that their share in the savings would equal at least 1 cent an hour additional, and stated to them that estimates made by the company showed that the savings would equal 2 cents an hour. In other words, he made a definite offer to guarantee 2 cents an hour during the period of the war and six months thereafter, and to give the men an additional 1 cent if they could save it. All of this was conditional only on the men co-operating with the company to bring about these savings.

RECEIVER MAKES STATEMENT

After the sub-committee of the general conference board, assisted by President Mahon and Executive Board Member John H. Reardon and Vice-President P. J. O'Brien informed Mr. Donham that they would have nothing whatever to do with the plan, Mr. Donham made a statement in which he said:

"I do not know what the intentions are of the representatives of the men, as they in no way expressed themselves in this regard, but it is a source of complete astonishment to me that the committee should take this position.

"The members of the committee stated they took the position because they thought I was trying to break up the union. This is not so. On the contrary, it has been my absolute intention to work with the union and I had so stated to them. Also that I was endeavoring to build up the spirit of co-operation between the company and the men, believing that the result of co-operation through them, working with their union, and me, as receiver, would be to the mutual advantage of both sides, and would be very greatly to the advantage of the public.

"For example, one of the principal features through which the men were to benefit in financial return was by their acting under our instructions to prevent accidents; another was saving power and thereby coal consumption, which is a matter of the very greatest importance to the public at the present time; third, by courteous and friendly treatment of passengers, thereby increasing riding, the results of which I was prepared to share with them.

"It will be noticed that the plan which I suggested to the men is not the ordinary profit-sharing plan, which is for the benefit of the individual workman, but that the plan which we worked out would have distributed the savings over men in large groups, a method

which, so far as I know, has never been in any way considered opposed to the principle of collective bargaining."

W. D. Mahon, the president of the Amalgamated Association, said that the union had a contract with the company that contained ample provisions for any co-operation necessary and that he would not recommend to his men something he did not understand himself.

Service-at-Cost Plan

Rumor Has It That the Massachusetts Legislative Investigating Committee Will Recommend This Plan

Holders of electric railway securities will be guaranteed a return of 6 per cent on their investment, jitney competition will be greatly reduced, excise and commutation taxes will be abolished and increased electric freight and express service will be authorized if the Massachusetts Legislature adopts the recommendations of the special commission on street railways as forecasted at Boston during the week ended Feb. 2 in anticipation of the filing of the formal report of that body.

Up to Jan. 30 the report had not been filed, but many of the anticipated recommendations were being freely discussed at the State House. Bills already filed contain provisions along the line of the legislative commission's recommendations. The legislative commission is expected to make it clear that it does not feel that State ownership and operation would solve the electric railway problem and that it does not approve of the State's acting as banker for companies in financial straits. It is understood that Governor McCall would not approve either of these plans.

According to reports the legislative commission indorses the service-at-cost plan first suggested by the Association of Owners of Massachusetts Street Railway Securities. A bill providing legislation putting this plan into operation has been prepared and will be offered to the Legislature. Under this plan the State would appoint a State director for each road and accountants to examine the books; the Public Service Commission would determine the amount of invested capital, and each company would be obliged to set aside from 4 per cent to 8 per cent of its capital stock as a reserve fund, the maximum fund being \$1,000,000. Rates would be fixed semi-annually, each company being obliged to file eight different schedules of fares, four above and four below its present schedule, and establishing variations of from 1 cent to 10 cents on lines now charging 5 cents. All profits would be turned into the reserve fund, and if the fund increased 30 per cent in six months, the fare would drop 1 cent during the next six months.

Authority to grant electric railway freight permits would be taken from local municipal governments and vested in the Public Service Commission, and the companies would be relieved of all street repair work except between the tracks in paved streets and a space 18 in. outside each rail on unpaved streets.

Car Hearing Goes On

B. R. T. Again Argues for Relief from Order Requiring Purchase of 250 Surface Cars

The Public Service Commission for the First District of New York on Jan. 23 reopened the hearings on the order to compel the Brooklyn Rapid Transit Company to buy and operate 250 new surface cars.

William Siebert, superintendent of surface lines of the company, testified that, owing to the opening of new transit lines, it was his opinion no new surface cars were needed.

John L. Wells, of counsel for the company, said that the situation had changed since the order was issued because the war had made it much more difficult to procure motormen and conductors, and that to buy the surface cars required by the order would necessitate the company borrowing \$3,000,000. Mr. Wells contended that on account of the opening of the new high-speed lines adequate service on the surface lines would be possible very soon by using fewer cars. Commissioners Whitney and Hervey demanded a tabulation from the company supporting this contention.

John J. Dempsey, vice-president of the company, estimated that the opening of the Brighton Beach-Flatbush Avenue-Eastern Parkway-Eastern District subway would be equivalent to an addition of 250 new surface cars, while W. S. Menden, chief engineer of the New York Municipal Railway Corporation, which operates the dual rapid transit lines allotted to the Brooklyn Rapid Transit Company, estimated that the operation of 400 surface cars would be saved by the new tubes.

Walter Barnaby, auditor of receipts of the Brooklyn Rapid Transit Company, testified that there had been an average decrease in receipts of \$50,000 a month for the last four months of 1917 over the similar period of 1916 on the surface lines. He mentioned the Fifth Avenue, Third Avenue, Flatbush-Seventh and Smith Street lines as those on which the falling off in traffic was most marked.

On Jan. 28 Charles H. Sabin, president of the Guaranty Trust Company, testified that he believed it would be unwise to compel any corporation at this time to spend money unnecessarily. He said that he was not competent to decide what was necessary in the matter of railroad facilities for the city.

John J. Dempsey, vice-president of the company, testified that if the third tracking of the Fulton Street elevated line in Brooklyn had been completed, and if other transit improvements, now under way, were ready for operation, the 250 cars would not be necessary. He added that when the pending improvements were finished it would be possible to take from the surface lines from 296 to 500 cars.

William H. Williams, of the Delaware & Hudson Railroad, introduced by the Brooklyn Rapid Transit Company as a witness, said that no railroad

should spend any money during the war on new equipment. He insisted that permission from the federal government should be obtained before the Public Service Commission required any of the companies under its jurisdiction to put any money into improvements during the war.

Engineers and Mechanics for Aviators

The Navy Department announces that men will soon be selected for aviation service. Men of suitable qualifications who report now to the Navy recruiting offices are eligible for examination for commissions and ratings. The rates of pay and duties assigned in this aviation work in the Navy will make this opportunity highly attractive to mechanical engineers and to draftsmen, mechanics and others who are experienced in gasoline engine design or operation. Among the men desired are the following:

Graduate mechanical engineers and men of experience along engineering lines for special duty in the bureau of steam engineering, and in connection with work of this bureau at various places.

Mechanical engineers for special work under the bureau of construction and repair. These men will be used in connection with the development of air craft.

Mechanical draftsmen for duty in bureau of construction and repair on aviation work. These men will receive special aeronautical training as needed.

Suitable men for training for quartermasters (aviation) and carpenters' mates. Men for training as quartermasters (aviation) should be experienced in fabric work, wire working or any form of light rigging. For carpenters' mates (aviation) boat builders are especially desired, but any men with woodworking experience will be considered.

Ordnance Department Needs Help of Various Kinds

Stenographers, typists, production clerks, statisticians, multigraph operators, engineers of tests of ordnance material, assistant engineers of tests of ordnance material, machinists, tool-makers, mechanical draftsmen, munition inspectors, etc., are wanted for the ordnance department of the army to serve in the United States. For further information apply to the representative of the United States Civil Service Commission at the post office or custom house in any city, or to the Civil Service Commission in Washington, D. C. Except for the positions of stenographer and typewriter, typewriter operator, multigraph operator, and general clerk, applicants are not assembled for a written examination, but are rated principally upon their education, training, and experience, as shown by their applications and corroborative evidence.

News Notes

Last Kansas Horse Car Line Replaced.—The Consolidated Street Railway, operating 2 miles of railway between Cottonwood Falls and Strong City, Kan., with horses, has substituted a self-propelled electric car for the horse cars.

Storm Does \$150,000 Damage.—W. G. Murrin, assistant general manager of the British Columbia Electric Railway, Vancouver, B. C., recently placed the estimate of damage to the company's Fraser Valley line during the recent storms and washouts at \$150,000.

Bus Hearing in New York on Feb. 8.—The hearing before the Board of Estimate & Apportionment of New York City on the application of the Fifth Avenue Coach Company for permission to operate in Manhattan and the Bronx has been adjourned until Feb. 8.

Municipal Ownership Plan Carried.—Municipal ownership of the electric railway facilities in Windsor, Ont., after the expiration of the franchise of the Sandwich, Windsor & Amherstburg Railway in 1932 is probable, following the recent election, when a vote of 1462 to 317 carried a proposition for such a change. An extension of the electric railway franchise was voted down 855 to 366, while the plan for the city to make needed improvements on the lines and to charge a rental therefor until 1932 carried by a vote of 958 to 380.

Suit to Test Cleveland Rapid Transit Act.—Prosecuting Attorney Samuel A. Doerfler of Cleveland, Ohio, on Jan. 24 filed in the Ohio Supreme Court a writ of ouster against the Cleveland Rapid Transit Commission on the ground that a city, which is operating under a home-rule charter, cannot avail itself of the provisions of the general law. It is claimed that the members of the commission are holding office without warrant of law. This suit was brought merely to test the legality of the commission before it proceeds with the work for which it was created.

Praise for Milwaukee Company.—The Milwaukee *Wisconsin* said of the Milwaukee Electric Railway & Light Company in its issue of Jan. 9: "The Milwaukee Electric Railway & Light Company, profiting by experience of former years, has attained a high degree of efficiency in combating the efforts of old King Winter to put it out of business. It deserves credit for the car service it gave the public in spite of the recent storm, and for the benefit to the community incidentally derived from the open space it maintained between the drifts on streets occupied by its tracks. This might have been an advantage of incalculable value in case of fire."

Financial and Corporate

Federal Financing Aid

Secretary McAdoo Urges Congress to Authorize \$500,000,000 Corporation to Handle Security Issues

The creation of a \$500,000,000 government corporation to make loans and advances to enterprises essential to the war and otherwise assist in private financing was recommended to Congress on Jan. 28 by Secretary McAdoo.

The Secretary also asked that all private issues of securities of more than \$100,000 be made subject to the approval of the government body, to be known as the "War Finance Corporation."

The proposed corporation would have power to make advances to banks which finance industries essential to the war or to buy direct the securities of such corporations, subject to certain restrictions concerning price and length of the loans. The corporation also would make short-time advances to savings banks.

Further powers of the corporation would be "to subscribe for, acquire and own, buy, sell and deal in bonds and obligations of the United States." It could issue notes or bonds of its own of an amount not more than eight times its capital, which would be supplied originally by the government.

The corporation would be managed by the Secretary of the Treasury and four directors to be appointed by the Secretary with the approval of the President. The draft of a bill embodying Secretary McAdoo's suggestion was prepared and will be introduced shortly in both houses of Congress.

ADVISORY BOARD

In accordance with a plan to have the Federal Reserve Board pass upon voluntary security applications, Allen B. Forbes of Harris, Forbes & Company, New York, has been appointed chairman of a board of three advisers to the federal body. The recommendation for a securities authorization board by a special committee of the Investment Bankers' Association of America, of which Mr. Forbes was chairman, was noted in this journal last week.

B. R. T. TO HAVE HELP

At the annual meeting of Brooklyn Rapid Transit Company on Jan. 25 T. S. Williams, president, in reply to the inquiry by stockholders regarding the \$57,000,000 of notes which mature next July, said that the company's officials had taken up the matter of this maturity with the Federal Reserve Board authorities in Washington and had been directed by them to take up the matter with the local authorities. This maturity is one of the largest occurring in 1918.

The local Reserve Bank authorities

have the matter under consideration. Mr. Williams said: "I want to express full confidence that whether such financing is undertaken by the government or privately in some way, the maturity of these notes will be taken care of without any question. The government authorities have asked the company's officials to take no definite step in regard to the note matter until they (the government authorities) arrive at a decision."

Interborough-Consolidated Report

Company Received 20 per Cent on Interborough Stock and Pays 6 per Cent on Own Preferred Issue

According to the report of the Interborough-Consolidated Corporation, New York, N. Y., for the calendar year 1917, the surplus balance on Dec. 31 totaled \$1,645,356, as compared to \$1,875,877 the year before. Indebtedness amounting to \$750,000, however, which was part of money advanced by the Bankers Trust Company in June, 1916, was paid off in 1917.

As shown in the accompanying income statement, the company received 20 per cent dividends on its holdings of Interborough Rapid Transit stock, and it paid 6 per cent on its own preferred issues. The company had in its sinking fund on Dec. 31, 1917, \$2,881,588 of Interborough-Metropolitan 4½ per cent collateral trust bonds.

Surplus balance Dec. 31, 1916...	\$1,875,877
Dividends on Interborough Rapid Transit Company stock.....	\$6,782,560
Interest and dividends on securities owned	138,403
Interest on loans, bank balances, etc.	34,902
Total income	\$6,955,865
Total	\$8,831,743
Interest on Interborough-Metropolitan 4½ per cent collateral trust bonds	\$3,052,125
Interest on advance from Bankers Trust Company.....	65,562
Interest on bills payable.....	2,964
Sinking fund on Interborough-Metropolitan 4½ per cent collateral trust bonds.....	300,000
Administration and general expenses	41,809
Taxes	229,494
Total deductions	\$271,304
Total	\$3,691,956
Surplus available for dividends..	\$5,139,786
Dividends on preferred stock..	2,744,430
Net surplus	\$2,395,356
Appropriation to Bankers Trust Company	750,000
Surplus Dec. 31, 1917.....	\$1,645,356

The company controls the Interborough Rapid Transit Company subway and elevated lines and the surface lines of the New York Railways through ownership of stock.

Abandonment Set for Feb. 1

Alton & Jacksonville Railroad to Discontinue Operation Under Authority from Illinois Commission

The Alton & Jacksonville Railroad, successor to the Alton, Jacksonville & Peoria Railway, which has been operating an interurban railroad between Alton and Jerseyville for several years, was to discontinue operation and dispose of its property after Feb. 1, by virtue of authority granted by the Illinois Public Utilities Commission in a recent case (7188), in which the company made application for such authority. The city of Alton, the city of Jerseyville and former bondholders of the company appeared in opposition to the application.

Testimony submitted at the hearing in this matter showed that the territory served by the Alton & Jacksonville Railroad was also served in a general way by the Chicago & Alton and the Chicago, Peoria & St. Louis steam railroads. During the period from Jan. 1, 1916, to June 30, 1917, the Alton & Jacksonville operated at a net loss of \$46,274, of which amount \$7,276 was an operating deficit. Taxes amounted to \$5,247 and interest on the \$450,000 of outstanding bonds was \$33,750. No interest was paid on these bonds during this period nor at any other time. The testimony further showed that from \$65,000 to \$90,000 would be needed for repairs, if operation of the road were to be continued.

The commission found that the territory through which the Alton & Jacksonville Railroad operates is not such as demands the operation of such a road, nor such as would, with reasonable certainty, make the operation of the road under the most efficient management a profitable undertaking. According to the commission order the railroad should probably never have been built.

HOW PROCEEDS OF SALE MUST BE USED

In authorizing the sale of the physical property of the railroad, the commission ordered that the proceeds of the sale must be applied and disposed of in the following manner:

1. To the payment of any State, county, municipal or government taxes or assessments, judgments and liens, except bonds, due and payable, if any;
2. To the payment of open accounts, if any exist, due and owing by said railroad company;
3. To the payment of accrued interest on the bonded indebtedness;
4. To the payment of principal of bonded indebtedness;
5. The balance, if any, to be distributed to the stockholders as their interests may appear.

The case of the Alton & Jacksonville Railroad was appealed to the Circuit Court of Sangamon County on Jan. 9. No motion was made for a rehearing and no stay order had been asked up to Jan. 29. At that time it was stated that the commission's order would become effective on Feb. 1 unless further action was taken prior to that date.

Electric Railway Statistics

Comparison of Returns for October, 1917, With Those for Same Period in 1916 Show Increasing Cost of Operation

A comparison of electric railway statistics for October, 1917, with figures for the corresponding month of 1916, made by the Information Bureau of the American Electric Railway Association, indicates a continued rise in operating expenses. This condition is noticeable throughout the country, although in the Southern District traffic in connection with the operation of military camps has apparently tended to accelerate somewhat the rate of increase of operating revenues.

Data for October, 1917, representing 7394 miles of line of electric railways scattered throughout the country, figured on the per mile of line basis, indicate an increase in operating revenues of 5.78 per cent and in operating expenses of 12.65 per cent, and a decrease in net earnings of 5.77 per cent. Data representing approximately 70 per cent of this mileage indicate an increase in the amount of taxes paid of 10.53 per cent and in operating income a decrease of 13.73 per cent.

The returns from the city and inter-urban electric railways, as shown in detail in the accompanying table, have been classified according to the following geographical grouping: Eastern District—East of the Mississippi River and north of the Ohio River; Southern District—South of the Ohio River and east of the Mississippi River; Western District—West of the Mississippi River.

Of the three groups shown returns for the Southern apparently indicate a slight degree of improvement over the corresponding period of the previous year, while returns for the Eastern and Western are decidedly unsatisfactory. Data for the Eastern group, rep-

resenting 4722 miles of line, show an increase in operating revenues of 4.41 per cent and in operating expenses of 10.55 per cent, and a decrease in net earnings of 6.92 per cent.

Returns for the Western group, representing 1668 miles of line, indicate an increase in operating revenues of 8.64 per cent and in operating expenses of 20.89 per cent, and a decrease in net earnings of 9.18 per cent. Returns representing approximately 85 per cent of this mileage indicate an increase in the amount of taxes paid of 19.58 per cent and a decrease in operating income of 18.63 per cent. The unfavorable returns for the Western district may largely be accounted for by labor difficulties as well as by a general rise in the wage scales of electric railway employees.

The operating ratio for the country as a whole has increased from 62.68 in 1916 to 66.76 in 1917. The operating ratio of the Eastern District has increased from 64.88 in 1916 to 68.89 in 1917, while that of the Western group has increased from 59.27 in 1916 to 65.95 in 1917.

Abandonment Confirmed
Ohio Court Upholds Commission in Its Decision Not to Require Continuance of Operation

The Supreme Court of Ohio has ruled that under the law the Ohio Public Utilities Commission has no authority to set a date for an interurban railway to go out of business after the company has failed. The question arose from an appeal by patrons of the Lake Erie,

Bowling Green & Napoleon Railway to the commission to prevent suspension of operation. The commission decided it did not have jurisdiction, and dismissed the case. The Supreme Court affirmed the decision.

At the same time the court decided that Theodore Luce, who purchased the railway, may proceed to junk it. Suit had been brought by the prosecuting attorney of Wood County to oust him as head of the bondholders' committee, which purchased the line and began to junk it, in the hope that some arrangement might be made to continue it in operation. It was contended that the road would pay if properly managed. Since that time another road has arranged to operate a portion of the line, but under the decision since rendered the owner may dismantle the line, should he so decide.

The light and power plant at Bowling Green, which was owned by the company, has been operated continuously.

Data for Stockholders' Tax Return

The section in the present income tax law which provides that profits or surplus paid to stockholders as dividends "shall be taxed to the distributee at the rates prescribed by law for the years in which such profits or surplus were accumulated by the corporation" is leading many companies to send notices to stockholders, giving the facts, so that the individual stockholder may properly make up his income tax statement. The detail with which some of these dividend statements to stockholders are prepared is shown by the following notice issued by Wells Fargo & Company on Jan. 19, 1918:

The attention of stockholders is called to the fact that the dividends paid in 1917 are, under the provisions of the income tax

COMPARISON OF REVENUES AND EXPENSES OF ELECTRIC RAILWAYS, OCTOBER, 1917 AND 1916. COMPILED FROM MONTHLY RETURNS OF ELECTRIC RAILWAYS TO THE AMERICAN ELECTRIC RAILWAY ASSOCIATION

ACCOUNT	UNITED STATES				EASTERN DISTRICT				SOUTHERN DISTRICT				WESTERN DISTRICT			
	Amount, October, 1917	PER MILE OF LINE			Amount, October, 1917	PER MILE OF LINE			Amount, October, 1917	PER MILE OF LINE			Amount, October, 1917	PER MILE OF LINE		
		1917	1916	In- crease Over 1916, per Cent		1917	1916	In- crease Over 1916, per Cent		1917	1916	In- crease Over 1916, per Cent		1917	1916	In- crease Over 1916, per Cent
Operating revenues.....	\$13,809,872	\$1,868	\$1,766	5.78	\$8,716,797	\$1,846	\$1,768	4.41	\$1,506,117	\$1,500	\$1,393	7.68	\$3,586,958	\$2,150	\$1,979	8.64
Operating expenses.....	9,219,519	1,247	1,107	12.65	5,987,967	1,268	1,147	10.55	866,160	862	800	7.75	2,365,392	1,418	1,173	20.89
Net earnings.....	4,590,353	621	659	15.77	2,728,830	578	621	16.92	639,957	638	593	7.59	1,221,566	732	806	19.18
Operating ratio, per cent.....	1917, 66.76; 1916, 62.68				1917, 68.89; 1916, 64.88				1917, 57.47; 1916, 57.43				1917, 65.95; 1916, 59.27			
Av. No. of miles of line represented.....	1917, 7,394; 1916, 7,291				1917, 4,722; 1916, 4,694				1917, 1,004; 1916, 956				1917, 1,668; 1916, 1,640			

COMPANIES REPORTING TAXES																
Operating revenues.....	\$9,679,043	\$1,751	\$1,664	5.23	\$5,650,323	\$1,594	\$1,542	3.37	\$815,785	\$1,610	\$1,476	9.08	\$3,212,935	\$2,177	\$2,024	7.56
Operating expenses.....	6,757,118	1,223	1,084	12.82	4,161,466	1,174	1,078	8.91	460,373	909	815	11.53	2,135,279	1,447	1,194	21.19
Net earnings.....	2,921,925	528	580	18.97	1,488,857	420	464	19.48	355,412	701	661	6.05	1,077,656	730	830	12.05
Taxes.....	697,620	126	114	10.53	374,550	106	101	4.95	71,371	141	116	21.55	251,699	171	143	19.58
Operating income.....	2,224,305	402	466	13.73	1,114,307	314	363	13.50	284,041	560	545	2.75	825,957	559	687	18.63
Operating ratio, per cent.....	1917, 69.85; 1916, 65.14				1917, 73.65; 1916, 69.91				1917, 56.46; 1916, 55.22				1917, 66.47; 1916, 58.99			
Av. No. of miles of line represented.....	1917, 5,527; 1916, 5,473				1917, 3,545; 1916, 3,517				1917, 507; 1916, 507				1917, 1,476; 1916, 1,449			

†Decrease.

law quoted below, "deemed to have been made from the most recently accumulated undivided profits or surplus," which were as follows:

Semi-annual dividend declared Dec. 28, 1916, and paid Jan. 20, 1917, from earnings of the calendar year of 1916.

Quarterly dividend declared March 22, 1917 and paid April 20, 1917: \$1.4217 from 1917 earnings, \$0.0783 from surplus earnings accrued prior to March 1, 1913.

Quarterly dividends declared June 28 and Sept. 27, 1917, and paid respectively July 20 and Oct. 20, 1917, from 1917 earnings.

Special dividend declared Dec. 28, 1916, and paid Jan. 20, 1917, from surplus earnings accrued during the following periods: Prior to March 1, 1913, \$9.3611 per share; March 1 to Dec. 31, 1913, \$1.1999 per share; Jan. 1 to Dec. 31, 1914, \$1.44 per share; Jan. 1 to Dec. 31, 1915, \$8.7636 per share; Jan. 1 to Dec. 31, 1916, \$12.5686 per share.

One-Man Cars Save Road

At the annual meeting of stockholders of the Batavia (N. Y.) Traction Company, Stephen W. Brown, president of the company, announced that the company has been placed on a sound financial basis through the operation of one-man pay-as-you-enter cars. There was an increase of 28,000 fares in 1917 over the preceding year, the total for 1917 being 343,000 fares. The company operates single-truck, double-end one-man cars. The company is also planning the construction of new lines in rapidly growing sections of the city and a 5-mile, single-track line to Horseshoe Lake, a summer resort.

Financial
News Notes

Sold Under Foreclosure.—The Orleans-Kenner Electric Railway, 16 miles long from New Orleans to Kenner, La., is reported sold under foreclosure to J. Blanc Monroe for \$225,000. It is understood that the purchase was made on behalf of the bondholders.

Preferred Dividend in Scrip—Common Passed.—The directors of the Com-

monwealth Power, Railway & Light Company, Grand Rapids, Mich., have decided to pay the preferred dividend in scrip and drop the common stock dividend. The company has obligations coming due in May and it was decided to conserve the cash, as government financing has made it difficult to finance the cost of improvements by the sale of securities.

Receiver for Illinois Road.—D. Harvey, master-in-chancery of Kane County, Ill., has been named receiver of the Chicago, Aurora & De Kalb Railroad, Aurora, Ill., upon a petition filed in the Kane County Circuit Court by the Continental & Commercial Trust & Savings Bank, Chicago, Ill., representing certain bondholders. These charge that while the interest is being paid on the bond obligations the company is not living up to the terms of the indenture securing the bonds which provides for a sinking fund for the redemption of these bonds.

New Republic Railway & Light Company Issue.—A syndicate headed by Reilly, Brock & Company and Harper & Turner, Philadelphia, Pa., are offering a portion of an issue of \$1,500,000 of Republic Railway & Light Company, Youngstown, Ohio, two-year 6 per cent convertible secured gold notes, due on Jan. 15, 1920. These notes are part of a total authorized issue of \$2,500,000. They are secured by deposit of an equal amount of Mahoning & Shenango Railway & Light Company 7 per cent preferred stock and all the common stock, and are further guaranteed as to principal and interest by indorsement by the Mahoning & Shenango Railway & Light Company.

Foreclosure Proceedings Likely Soon.

—The reorganization committee of the Petaluma & Santa Rosa Railway, Petaluma, Cal., has extended the time for deposit of bonds under the plan until and including Feb. 1. In a circular letter the committee states that the response to the call for deposit of the first and second mortgage bonds has been a gratifying one. It is added that

the reorganization agreement will become operative upon the deposit of 90 per cent of the outstanding bonds. The committee feels that this amount is practically assured. Foreclosure proceedings on both mortgages, it is stated, will probably be instituted without delay. A review of the affairs of the company was published in the ELECTRIC RAILWAY JOURNAL for Jan. 12, page 104.

Georgia Earnings Gain.—A. B. Leach & Company, summarizing reports of earnings of the Georgia Light, Power & Railways Company for the last six years, point out that the business of this company is substantially larger than ever before in its history. The figures for the calendar year 1917, approximated on the basis of actual earnings for eleven months to Nov. 30 and December estimated, show that gross earnings increased 13.4 per cent over 1916 and net earnings 13.8 per cent; net income, 25.3 per cent; balance, 73.3 per cent. The total earnings for the twelve months ended Nov. 30, 1917, amounted to \$1,164,261, as compared to \$1,028,949 in 1916, and the railway earnings increased from \$322,711 in 1916 to \$355,267 in 1917. The company controls the Macon Railway & Light Company.

New Monongahela Valley Note Issue.

—Hambledon & Company, Baltimore, Md., are offering at 99 and interest, to yield 7.05 per cent, \$3,000,000 of Monongahela Valley Traction Company one-year 6 per cent gold notes due on Feb. 1, 1919. The notes are in the denomination of \$1,000. The proceeds derived from the sale of the notes are being expended in the erection of a 20,000-kw. power plant and for other corporate purposes, such plant to be used in part for war needs, as demonstrated by the action of the United States government in giving priority orders for equipping the plant. The notes are followed by \$3,389,798 of preferred stock upon which dividends are paid at the rate of 6 per cent per annum, and \$8,278,086 of common stock upon which dividends are paid at the rate of 5 per cent per annum.

Electric Railway Monthly Earnings

CITIES SERVICE COMPANY, NEW YORK, N. Y.						JACKSONVILLE (FLA.) TRACTION COMPANY					
Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income	Period	Operating Revenues	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$1,712,683	\$30,257	\$1,682,425	\$227	\$1,682,198	1m., Nov., '17	\$60,939	\$42,368	\$18,571	\$15,848	\$2,723
1m., Dec., '16	1,570,819	20,310	1,550,509	314	1,550,195	1 " " '16	48,375	35,394	12,981	15,508	7,473
12m., Dec., '17	19,252,492	357,229	18,895,263	2,861	18,892,402	12 " " '17	690,833	462,942	227,891	188,581	39,310
12m., Dec., '16	10,110,342	239,389	9,870,953	258,961	9,611,992	12 " " '16	618,511	422,330	196,181	183,091	13,090
CLEVELAND, PAINESVILLE & EASTERN RAILROAD, CLEVELAND, OHIO						LAKE SHORE ELECTRIC RAILWAY, CLEVELAND, OHIO					
1m., Nov., '17	\$41,783	\$28,012	\$13,771	\$11,635	\$2,136	1m., Nov., '17	\$142,814	\$103,922	\$38,892	\$35,149	\$3,743
1m., Nov., '16	35,940	21,216	14,724	11,649	3,075	1m., Nov., '16	125,610	86,790	38,820	36,263	2,557
11m., Nov., '17	496,163	\$310,912	185,251	128,473	56,778	11m., Nov., '17	1,618,439	\$1,103,340	515,100	381,998	133,102
11m., Nov., '16	426,104	\$240,686	185,418	125,691	59,727	11m., Nov., '16	1,468,736	\$924,797	543,940	400,089	143,850
FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.						NORTHERN TEXAS ELECTRIC COMPANY, FORT WORTH, TEX.					
1m., Nov., '17	\$268,643	\$186,536	\$82,107	\$50,267	\$31,840	1m., Nov., '17	\$270,510	\$144,286	\$126,224	\$28,259	\$97,965
1 " " '16	209,936	\$131,340	78,596	49,018	29,578	1 " " '16	163,929	\$92,228	71,701	29,222	42,479
11 " " '17	2,559,445	\$1,798,210	761,235	543,485	217,750	12 " " '17	2,470,263	\$1,399,013	1,071,250	348,390	\$72,025
11 " " '16	2,271,968	\$1,504,507	767,461	536,251	231,210	12 " " '16	1,904,904	\$1,149,770	755,134	347,583	407,551
HOUGHTON COUNTY TRACTION COMPANY, HOUGHTON, MICH.						PHILADELPHIA (PA.) RAPID TRANSIT COMPANY					
1m., Nov., '17	\$25,987	\$16,986	\$9,001	\$5,075	\$3,926	1m., Dec., '17	\$2,622,429	\$1,582,589	\$1,039,840	\$810,783	\$229,057
1 " " '16	26,089	\$14,468	11,621	5,241	6,380	1m., Dec., '16	2,487,287	1,396,094	1,091,193	813,920	277,272
12 " " '17	341,718	\$211,220	130,498	61,465	69,033	6m., Dec., '17	15,030,458	8,817,187	6,213,271	4,867,365	1,345,906
12 " " '16	323,507	\$183,470	140,037	64,197	75,840	6m., Dec., '16	13,857,145	7,703,819	6,153,326	4,887,233	1,266,092
UNITED LIGHT & RAILWAYS COMPANY, GRAND RAPIDS, MICH.						UNITED LIGHT & RAILWAYS COMPANY, GRAND RAPIDS, MICH.					
12m., Nov., '17	\$2,046,898	\$1,170,122	\$1,876,776	\$689,368	\$1,187,408	12m., Nov., '17	\$2,046,898	\$1,170,122	\$1,876,776	\$689,368	\$1,187,408
12m., Nov., '16	1,849,084	\$1,163,131	1,707,453	575,006	1,131,447	12m., Nov., '16	1,849,084	\$1,163,131	1,707,453	575,006	1,131,447

*Includes taxes. †Deficit. ‡Includes non-operating income.

Traffic and Transportation

Increase in Fare in Spokane

Companies There Will Raise Price of School Tickets to Four Cents and Charge Five Cents for Others

Officials of both the Spokane Traction Company and the Washington Water Power Company, operating electric railways in Spokane, Wash., express the hope that by increasing the rate on tickets to school children from 2½ cents each to 4 cents each, effective from Feb. 1, and by discontinuing the sale of twenty-two tickets to others at \$1 and obliging these patrons to pay a straight 5-cent fare they will be able to increase earnings.

Waldo G. Paine, vice-president and traffic manager of the Spokane Traction Company, and C. S. MacCalla, vice-president and general manager of the Washington Water Power Company, say that until this has been tried no move will be made to charge a 6-cent fare.

The recent intimation from these officials that later such a move may be made resulted in the Corporation Counsel being instructed to investigate the law. He reported that the present State law does not permit the companies to charge more than 5 cents for fare.

Traffic Rules Approved

Police Departments of New York State Cities Agree to Uniform Rules for Controlling Traffic

Uniform traffic regulations for New York State have been approved by the police departments of the cities of the State, according to a statement made public by the New York State Conference of Mayors and Other City Officials on traffic regulation and the causes of automobile accidents.

In a report to the conference the State Bureau of Municipal Information says:

"We are pleased to report that the police departments have universally approved the new law and that no changes of material importance have been suggested. The reports to us show that the law has worked out admirably in all the cities and that the uniform regulations have been generally observed with the result that the number of accidents, compared with the increase in automobile traffic in the cities, has been reduced. There is, however, need for greater effort to reduce accidents and make the highways safer."

RECOMMENDATIONS SUGGESTED

Basing its suggestions on the reports of the police departments the bureau has recommended to the conference the following:

1. A more rigid enforcement of both the State highway traffic act and the

speed provisions of the State automobile law.

2. A better knowledge of the traffic and speed laws and compliance with their provisions by the drivers of all kinds of vehicles.

3. The regulation of pedestrians crossing or in any way using the highways.

4. Changes in the automobile headlight law.

5. A law requiring the registration of drivers and an adequate examination and test of at least all new operators of automobiles and motorcycles.

6. Greater co-operation between police and parents in regulating the play of children in the streets, and increased recreation facilities in congested districts.

The Mayors' Conference has called a meeting for the purpose of discussing these suggestions and considering needed legislation.

Fare Advance for Seattle

Puget Sound Traction, Light & Power Company Preparing Petition for Six-Cent Fare

The Puget Sound Traction, Light & Power Company is preparing a petition to the State Public Service Commission for permission to advance railway fares in Seattle to 6 cents. According to information received from Olympia, action by the Public Service Commission on the company's petition likely will await an examination of the company's books to ascertain present receipts and disbursements. This examination was ordered by the commission recently on the company's statement that it intended to file a 6-cent schedule. As the investigation is being made in advance of the receipt of the petition from the company, it is expected that the case will be ready for immediate hearing when the filing of the petition for an increase in fare is made.

Walter F. Meier, acting corporation counsel of the city, has advised the City Council to prepare to oppose any attempt to increase fares in Seattle.

Emergency Committee for Pittsburgh

An emergency transportation committee has been appointed by Mayor E. V. Babcock of Pittsburgh, Pa., to assist in helping to improve service on the lines of the Pittsburgh Railways. Members of the committee are: John W. Weibley, president of the Pittsburgh Taxicab Company; Reid Kennedy, president of the Monongahela Trust Company; J. R. Rider, vice-president of the Pressed Steel Car Company; David J. Berry, editor of the *National Labor Journal*; A. W. Robertson, attorney of

the Pittsburgh Railways, and David C. Ainey, assistant engineer of the Public Service Commission. Among the points to be worked out by the committee are the following:

Adoption by the Pittsburgh Railways of such means as might be considered sufficient to induce patrons to use the cars in non-rush hours; co-operation of manufacturers in arranging work periods so as to utilize the best available facilities of the railway; efforts by merchants to induce customers to shop in the non-rush hours, and active support of commercial, industrial, civic and press bodies in promoting the public welfare.

The civic bodies which are leading the campaign for improved service have been notified that the State Public Service Commission will hold hearings in Pittsburgh within a few days to receive complaints.

Food at Cost in Baltimore

Company There, as War Emergency Move, Goes to the Aid of Its Employees

The United Railways & Electric Company, Baltimore, Md., has arranged to aid its employees to obtain foods at cost. This war emergency measure will be tried out at once.

A commodious and ample room with a large storage space adjoining is being erected in the carhouse at Charles Street, near Lafayette Avenue. This location is central and served by several lines, making it convenient of access from all parts of the city.

This war emergency measure is being undertaken voluntarily by the company to assist its employees during the period of high prices. Nothing in the way of profit will be added to the cost price of the foodstuffs. If the employees find the savings sufficiently attractive, the distribution will be maintained while prices continue high.

EMPLOYEES ON MANAGEMENT COMMITTEES

In order to make the plan fully effective, a number of the employees have been asked to serve as a committee to make suggestions and to supervise the purchases and operation of the scheme so that it may be made to meet the emergency most completely.

Employees and their wives will be provided with suitable means of identification to the end that this distributing agency will only be used by them for purchasing at cost food necessities bought by the United States in wholesale quantities.

Still further to insure the success of the undertaking free transportation will be given to the wife of each employee so that there will be no expense imposed in going to and from the Charles Street location.

Among the things that will be distributed to the employees are beef, pork, mutton, ham, butter, lard, canned goods, flour, corn meal, potatoes, turnips, apples, oranges, crackers, rice, sugar, coffee, tea, etc.

War Conditions Discussed at Boston Hearing

Chairman of Commission Says Boston Elevated Needs More Modern Cars—Traction Company Has Lost 900 Men Since War

The effect of the war upon electric railway service conditions was discussed before the Public Service Commission of Massachusetts recently at a hearing called upon a general complaint of the service of the Boston Elevated Railway in Dorchester following the opening of the South Station-Broadway section of the Dorchester tunnel. The bone of contention was the handling of traffic at the Broadway terminal of the tunnel, where transfer is made between through trains to and from Harvard Square, Cambridge and surface lines serving South Boston and Dorchester.

QUICK PASSENGER MOVEMENT NECESSARY

The point was made that the tunnel in its uncompleted state could not handle the traffic thrown upon it at Broadway station from both South Boston and Dorchester. It was also charged that the company had failed to secure an adequate number of conductors and motormen through its policy of discouraging the employment of men subject to the draft.

Chairman Macleod, of the commission, said that the electric railway service of the State had broken down in the sense that the steam railroad service had failed to meet the test of war conditions under private ownership and operation. He pointed out that the service could not be handled by the Boston Elevated Railway in this district until some way could be found to provide a large number of new cars of a modern type, susceptible to quick loading and unloading, in order to relieve the congestion to move the passengers quickly at terminal and concentration points.

NEITHER CASH NOR CREDIT AVAILABLE

The company claims that it had neither cash nor credit with which to purchase additional cars, and that if it had, it could not secure deliveries under a year or two. Mr. Macleod said that high prices ought not to deter the expansion of existing facilities under private ownership, if any way could be found to effect it; if not, the problem would then have to narrow itself down to the most efficient utilization of the equipment that the company had on hand, and that resolved itself into a proper balancing of service between different communities, districts and lines.

Edward Dana, manager of surface transportation of the Boston Elevated Railway, said that from July 1 to Dec. 31, 1917, the company had hired 887 men, 300 of whom were between the ages of twenty-one and thirty-one. Men ostensibly subject to the draft had not been employed. The company operated 16,000 trips a day and was losing between 200 and 300 trips in the rush hours. At present there were 114 cars per hour scheduled around the

loop at the Broadway station, and about 6500 persons passed through. The cars were less suited to the traffic than those that were operated through Harvard Square station, at the other end of the tunnel.

New center-entrance motor cars were being fitted out of service as fast as possible, fifty-seven having been received out of an order for 100. Forty-two of these cars were required in the East Boston Tunnel. It was suggested that present conditions be improved by operating a portion of the service to the upper level of the Broadway station and by restoring the service between Meeting House Hill and Dudley Street, to enable the Washington Street tunnel to be utilized by some of the patrons of the company now routed through the Dorchester tunnel. Forty-one of the 114 rush-hour cars at Broadway station were destined for South Boston. Since July 1, 354 men had left the company's service and about 900 had left since war was declared against Germany by the United States.

Ohio Fare Changes Likely

First the Interurbans, Now the City Companies, Find Their Burdens Too Great

Fare changes for roads in Ohio other than those referred to in the *ELECTRIC RAILWAY JOURNAL* from time to time recently would seem to be in prospect. The Cleveland Railway will probably be able to manage matters for a time, with its adjustable scale of fares, but officers have already pointed out the possibility of an even higher rate than is provided in its grant, should the heatless days prove as much of a loss as at first anticipated.

The Columbus Railway, Power & Light Company, it is currently reported, will shortly ask for an increase in fare commensurate with the rates that are paid in other cities of similar size. Officials state that the cost of fuel, materials and labor has increased out of all proportion to the growth of the business. The company is now selling tickets at the rate of eight tickets for a quarter. This is lower than the present rates at Cleveland, although Cleveland is the boasted 3-cent city of the country.

Intimations have been made to members of the Council at Youngstown that the Mahoning & Shenango Railway & Light Company will shortly ask for a flat 5-cent fare on the city lines. At the present time twenty-five tickets can be purchased for \$1.

The Interurban Railway & Terminal Company, Cincinnati, has taken an appeal to the Supreme Court from the holding of the Public Utilities Commission on an action in which it asked for an increase in the rate of fare to 2½ cents a mile. The city of Cincinnati

filed a demurrer to the company's petition and it was sustained by the commission.

The petition of the Ohio Electric Railway for an increase in its rate of fare was heard before the commission on Jan. 23. Only minor objections were made to the proposed increase, although the road has 700 miles of track. Statistics were presented to show that the road was being operated at a loss under the greatly increased cost of everything. Decision was reserved.

An examination of the books of the Toledo Railways & Light Company is now under way to determine whether increased wages can be paid to the motormen and conductors. Officers of the company contend that it will be impossible to increase wages without an increase in the rate of fare.

Fare Increase Denied

Ohio Commission Holds That Franchise Provisions Prevents It from Allowing Fare Advance

The application of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, for permission to file a new schedule of rates in excess of those provided for in its franchise has been refused by the Public Utilities Commission of Ohio. The commission held it has no jurisdiction to set aside rates prescribed in a franchise.

Application was filed by the company with the commission for the purpose of increasing rates on its interurban lines between Youngstown and Girard, Niles, Warren and Hubbard. It was proposed to raise the present rate from Youngstown to Girard from 5 to 10 cents, and from Youngstown to Warren from 15 to 25 cents. The other tentative advances were in proportion.

When the hearing on the case was held each of the communities was represented in opposition to the advance, while John T. Harrington appeared for the company. The latter contended that the advance was necessary for the company to maintain service. Representatives of the cities named alleged that the utilities commission was without jurisdiction in the matter, which was covered by local franchises.

The company has appealed to the State Supreme Court for the reversal of the decision of the commission. The question involved is the right of the commission to fix new rates regardless of rates prescribed in franchises, granted prior to the organization of the commission.

Praise for Evansville Railways

The Evansville (Ind.) *Courier* in a recent article paid a high tribute to the Evansville Railways, the Public Utilities Company, the Evansville, Suburban & Newburgh Railway and others. The paper said that it realized the difficulties which beset the interurban officials in the way of automobile competition and appreciated what increasing costs meant to the companies.

City May Buy and Loan Equipment to Railway

Mayor of Buffalo Sees in This Possible Solution of Problem to Which War Department Has Assigned Colonel Arnold

Unless orders are placed at once by the International Railway, Buffalo, N. Y., for 100 new cars in addition to the 100 side-exit Peter Witt cars now being received from the G. C. Kuhlman Car Company, the city will buy the equipment and lease it to the railway. Mayor George S. Buck made this statement to E. G. Connette, president of the International Railway, at a conference attended by members of the new municipal electric railway commission, Col. Bion J. Arnold, Chicago, of the War Department at Washington and John C. Brackenridge, who has been retained by the City Council to make a survey of traffic conditions on the city lines of the company.

COLONEL ARNOLD PROMISES AID

When President Connette said that several questions, including that of financing the purchase of the equipment, would have to be considered by directors of the company before such an order could be placed, the Mayor suggested that the notes of the International Railway covering the proposed equipment would be acceptable to banking houses, and Colonel Arnold of the War Department said that the government would aid in a situation involving transportation problems of workers in munitions plants and other war industries.

It has been agreed that the company shall have additional time in which to consider the placing of a new order for 100 cars. The company has been directed to place in operation in the meantime during the rush-hour periods all of its open cars as an emergency measure. Old cars not equipped with vestibules for the motormen may be rebuilt so as to afford the necessary protection and will probably be placed in operation until the new cars arrive.

HOW THE WAR BOARD IS INTERESTED

Federal officers in charge of production in munition and other war industries called the attention of the War Department at Washington to the railway situation in Buffalo, and it is because of this fact that Colonel Arnold was sent to investigate conditions. When President Connette explained to Colonel Arnold the many difficulties encountered by the company in getting its order of 100 cars from the car builders, the colonel promised the full co-operation of the government in getting the new equipment in the shortest possible time. A preliminary investigation disclosed that the car builders have been delayed through the loss of a shipment of electrical equipment from a Boston manufacturer. This shipment is now being traced by federal agents and every aid will be extended to the Kuhlman Company in an effort to rush the delivery of the Buffalo cars. The government has promised to provide flat cars to bring the new equip-

ment to Buffalo so as to avoid the delay caused by operating cars on their own power between Cleveland and Buffalo.

In a weekly report to the City Council on traffic conditions on the International lines in Buffalo, Mr. Brackenridge said that the company has based its car schedules upon too high a rate of speed. This caused frequent bunching of cars and delays. He said that the rate of 9 m.p.h. during the winter months was too high for Buffalo and that 7 m.p.h. should be the maximum during the winter. Mr. Brackenridge recommended that the company employ checkers to ride the cars and keep an accurate check on the length of time required for the car to reach certain specified points along the line. During a road inspection with members of the municipal electric railway commission Mr. Brackenridge reported he observed spaces between cars, considerably in excess of the 3600 ft. provided for under the schedule of this line. On the Elmwood Avenue line, which serves the Elmwood-Hertel industrial district and the large war plants, Mr. Brackenridge said that the schedule from terminal to terminal was thirty-eight minutes and the actual running time during rush-hour periods was fifty-eight minutes.

SCHEDULE SPEED TOO HIGH

In commenting on the schedule speed of this greatly congested line, Mr. Brackenridge said the rate of speed should be reduced from 9 m.p.h. to 6 m.p.h. and if this latter figure is found too low, it should be increased after careful checks are made by checkers who ride the cars. Mr. Brackenridge said that the low rate of speed would probably not work out well on paper, but that in actual operation it would prevent delays, bunching of cars and congestion. Statistics were filed with the municipal authorities by Mr. Brackenridge which had been taken from the "McGraw Electric Railway List" of August, 1917, showing the population per car and number of cars per mile of track operated in the large cities of the country.

POLICE AUTHORITY GIVEN TO SUPERVISORS

Upon the recommendation of Mr. Brackenridge, E. J. Dickson, vice-president of the International Railway, has agreed to place the company's thirty-two supervisors in uniform and each supervisor will be sworn in as a special officer and will display an officer's badge on the outside of his uniform so as to enable him to assert his authority in keeping track-hogs from delaying cars. Each supervisor will be placed in charge of 3 miles of double track. Mr. Brackenridge said that many of the irregularities he has observed in the operation of cars could be effectively corrected by uniformed supervisors.

Additional trains have been placed in operation on the belt line service around the city by the New York Central Railroad so as to relieve the traffic situation. Mr. Brackenridge said that with efficient operation and regular schedules, this loop service around the city could handle at least 42,000 passengers and thereby greatly relieve the street car situation.

Use of Women Protested

Brooklyn Labor Union Objects to the Employment of Women by the B. R. T.

In response to a protest made by the Central Labor Union of Brooklyn and Queens against the employment of women on the electric railways in Greater New York, Chairman Straus of the Public Service Commission for the First District has replied that if the union thought it could produce facts showing that the employment of women menaced the adequacy, safety or continuity of the service, an effort would be made to arrange for public hearings at which testimony along these lines might be submitted. Mr. Straus' statement was in part as follows:

THE COMMISSION'S ATTITUDE

"The commission has not the power to say on physical or moral grounds, or for reasons of health, public policy, or the maintenance of proper wage standards, that women shall or shall not be employed, or that only men shall be employed. The law thus far leaves to the companies the selection of employees and leaves to the companies and their agreement with present or prospective employees the determination of the wage contracts. The commission has no power to exclude either men or women from any employment by reason of sex, or to say that men or women shall not continue in the employment of a railroad company."

Mr. Straus said that the question of competency, qualifications, or suitability of employees could be treated by the commission only if the public safety or convenience was threatened.

Who Am I?

I do much good.
I am an asset to you.
I have made friends and followers for the company.
I am a universal rule; in fact, I have become a habit.
I help you to hold your job.
I am everywhere.
Great men have written books about me.
I am contagious.
Without me no business can be truly successful.
I am one of your good friends.
I gain much and lose nothing.
I am a habit well worth acquiring.
I am on an equal footing with kindness.
I am COURTESY.
JOHN C. RIESENBERGER in *Here We Are*.

Heating Order for Brooklyn

After a consideration of the coal supply and other conditions word was sent by the Public Service Commission for the First District of New York to the Brooklyn Rapid Transit Company on Jan. 26, that there no longer existed any reason why heat should not be furnished in the cars and trains of that system in Brooklyn, and that the commission would expect that beginning not later than Jan. 29 heat would be so furnished.

The company on Nov. 14 asked the commission to suspend its heating order during the rush hours. It was explained that it was not proposed to stop heating the cars altogether, but to heat them probably an hour before they were placed in service for the rush hour so as to reduce the energy necessary to maintain a reasonable temperature. The commission then approved a plan for a test of the new arrangement. This plan was referred to in the *ELECTRIC RAILWAY JOURNAL* of Nov. 24, 1917, page 967.

Transportation News Notes

Ordinance for Increased Fare.—An ordinance has been introduced in the City Council at Frankfort, Ky., providing for 6-cent fares. The Kentucky Traction & Terminal Company, which operates the city lines, announced that unless the relief which it asked was granted, it would have to curtail service materially.

Three Killed in Accident.—A rear-end collision in which an interurban car of the Louisville & Southern Indiana Traction Company, on the approach to the bridge over the Ohio River at Louisville, was struck by a through car from Indianapolis to Louisville late on Monday afternoon, Jan. 14, resulted in three deaths and a score of passengers injured.

Trainmen Required to Help Enforce Law.—The city of Houston, Tex., has enacted an ordinance by which conductors of electric railway cars are required to report to the city secretary when any automobile passes a car which has stopped to take on or discharge passengers. The city ordinances prohibit this, and the trainmen are required to assist in enforcing the law.

Youngstown Company Threatened.—The city solicitor of Youngstown, Ohio, was authorized by the City Council on Jan. 21 to notify the officials of the Mahoning & Shenango Railway & Light Company that if railway service was not increased 50 per cent within the next thirty days proceedings would be started to revoke the franchise under which the company is operating.

California Jitneys Disappearing.—Although a few months ago 800 jitneys were operating in Los Angeles, Cal., less than fifty are now in service, according to the *Key System News*. There is none in San Diego, Alameda or Berkeley, only about a dozen in Oakland, and a few in Sacramento. San Francisco is practically the only California city which still has a considerable number of the "parasites."

Bay State Bulletin on Press Articles.—The Bay State Street Railway, Boston, Mass., has begun the plan of sending a weekly memorandum to all department heads calling attention to articles in the technical press in which it is thought the recipients will be interested. Occasionally an entire article will be so circulated, as was the case with the text of some remarks by W. H. Glenn, Atlanta, which appeared in the *ELECTRIC RAILWAY JOURNAL* for Jan. 19, page 149.

426 Collisions in a Month.—The New York (N. Y.) Railways Company has made an analysis to show the streets most prolific in accidents in December. There were 426 collisions between cars and vehicles of different kinds during the month. As a result, five employees, twenty-five passengers, and fifty-seven persons on vehicles were injured. One hundred and sixty-nine passengers were injured getting on and off cars in the month. More people were hurt getting on than off. The company's latest compilation shows a total of 1143 accidents of all kinds in December, 1917, as compared with 1855 in December, 1916.

Help the Motorman!—The Quincy (Ill.) Railway, included in the Illinois Traction System, has appealed to drivers of vehicles and to pedestrians to co-operate with the motormen of its cars in an effort to reduce the number of street accidents. The company says: "Safety first. Help the motorman. The motorman sees hundreds of wagons, automobiles, bicycles and baby carriages crossing his track every day. He sees and has to watch the movements of thousands of persons. He has to stop his car hundreds of times. He has grave responsibilities. He has to be careful. Why not help him by being careful yourself?"

Relief from Special Fare Contract.—Judge Cushing of the Hamilton County (Ohio) Common Pleas Court held on Jan. 17 that the contract for a special monthly ticket rate for its employees made by the King Powder Company with the old Rapid Railway cannot be enforced in equity against the Interurban Railway & Terminal Company or its receivers and that the only relief possible for the employees of the powder company must come from the Public Utilities Commission. The powder company had sought to enjoin Charles S. Thrasher and Charles M. Leslie, the receivers, from discontinuing the old monthly rate.

New York Fare Cases to Proceed.—The Public Service Commission for the First District of New York has been informed that the Third Avenue Rail-

way and other surface railroads will be ready to go ahead with their cases when the hearings on the companies' applications for permission to charge 2 cents for transfers are resumed on Feb. 6. These hearings have been adjourned from time to time at the request of the companies, but the most recent adjournment was made at the request of the city of New York through the corporation counsel, who stated that the city, a party to the cases, would not be ready to resume until the date mentioned.

Fare Increase Proposed for Galesburg.—The Galesburg Railway, Lighting & Power Company, Galesburg, Ill., controlled by the Illinois Traction System, has decided to ask the State Public Utilities Commission for a straight 5-cent fare. At the present time the company issues twenty-five tickets for \$1, the tickets being sold only at the office of the company. It was originally intended to ask the City Council for the increase, but later when that body assured the company that it would not object to a request for the elimination of the tickets being made of the State commission, and that it would abide by the decision of the commission, it was decided to make the request direct to the State regulatory body.

New Publications

Income Tax Procedure, 1918. By Robert H. Montgomery. The Ronald Press Company, 20 Vesey Street, New York, N. Y. 800 pages. Leather, \$4.

This succeeds Mr. Montgomery's 1917 interpretation of the income tax law. It includes the latest possible advice regarding the new laws, and provision is made for sending to buyers a supplement of important treasury rulings soon expected. The book is noteworthy for its careful exposition of the law and its frank criticism of provisions and treasury rulings which the writer thinks should be changed.

How to Study. By George F. Swain, LL.D., professor of civil engineering in Harvard University and Massachusetts Institute of Technology. McGraw-Hill Book Company, Inc., New York. Sixty-five pages. Paper, 25 cents.

Into the small compass of this book Professor Swain has condensed the principles of a neglected but essential art. While every thinking man will concede that his progress depends upon his methods of study, very few have given much thought to mental processes. There is no doubt that even a casual reading of "How to Study," which is written in popular style, will enable any man who uses his head at all to use it to better purpose.

Personal Mention

P. M. Hatch, who has been manager of the Ponce (P. R.) Electric Company, is now in the ordnance department at Washington.

Bert H. Wales, formerly chief inspector of the Denver (Col.) Tramway, has been promoted to the position of superintendent of the South Division of the company.

W. L. Weston, manager of the Houghton County Traction Company, Houghton, Mich., has been commissioned a first lieutenant in the United States Infantry.

E. L. Milliken, lighting superintendent of the El Paso (Tex.) Electric Company, has been appointed manager of the Houghton County Traction Company, Houghton, Mich.

C. J. Munton, president and general manager of the Fort Wayne & Northwestern Railway, Kendallville, Ind., has been re-elected president of the Noble Motor Truck Company.

James O. Heyworth, president of the International Transit Company, Sault Ste. Marie, Mich., has been appointed manager, Division Wood Ship Construction, Emergency Fleet Corporation, United States Shipping Board.

Edmond O'Callaghan, formerly superintendent of employment and inspection and recently appointed assistant to the claim agent with the Bay State Street Railway, Boston, Mass., has resigned to become connected with O'Neil & Parker, Boston representatives of the United States Fidelity & Guaranty Company, Baltimore.

G. A. DeHaseth, chief engineer of the Tacoma Railway & Power Company and chief engineer and roadmaster of the Puget Sound Electric Railway, Tacoma, Wash., has been appointed manager of the Ponce (P. R.) Electric Company, in place of P. M. Hatch, now in the Ordnance Department at Washington. Both properties are controlled by Stone & Webster.

Dana L. Spring, who for the last nine years has been a member of the law firm of Norton, Penney, Spring & Moore, of counsel for the International Railway, Buffalo, N. Y., has resigned from the firm to enter partnership with Hamilton Ward. Mr. Spring has specialized in trial work and has handled this branch of the International Railway's negligence actions for several years.

A. J. Bush, Jr., Dallas, Tex., has been appointed assistant to the general manager of the Texas Electric Railway, Dallas, the consolidated Strickland lines. Mr. Bush will maintain headquarters in Waco and will have charge of the Waco division of the Texas Electric Railway, and will also be manager of the Waco city system, which is owned and operated by the Texas Electric Railway.

W. J. Flickinger, chairman of the efficiency committee of the Connecticut Company, New Haven, Conn., since Nov. 1, 1914, has been appointed to the position of assistant to the president. The title of chairman of the efficiency committee has been abolished. Mr. Flickinger entered railway work with the Lehigh Valley Railroad in June, 1899, and continued with that company until March, 1907. He was employed in the car shops and at the office of the master car builder of that company at Packerton, Pa., from June, 1899, to July, 1900. He was connected with the office of the superintendent of motive power of the company at South Bethlehem, Pa., from July, 1900, to September, 1905. He was employed in the office of the purchasing agent of the company in New York City from September, 1905, to March, 1907. On April 1, 1907, Mr. Flickinger entered the employ of the



W. J. FLICKINGER

New England Investment & Security Company, Boston, controlling the New Haven Railroad's electric railways in Massachusetts, as a clerk in the office of President L. S. Storrs, of that company, now president of the Connecticut Company. In September, 1908, at the time the offices of that company were moved to Springfield, Mass., Mr. Flickinger became chief clerk to Mr. Storrs. He continued in that capacity until July 1, 1911, at which time he went with Mr. Storrs in the same capacity with the Connecticut Company, New Haven, Mr. Storrs having been elected president of that company. On Nov. 1, 1914, he was appointed chairman of the efficiency committee of the Connecticut Company. In 1917 Mr. Flickinger was awarded the bronze replica of the Brady gold medal for 1916 awarded to his company for the best record by an electric railway for the year along safety lines. In addition to the other duties that will devolve upon him in the position of assistant to the president Mr. Flickinger

will continue the work heretofore carried on under the title of chairman of the efficiency committee. Mr. Flickinger was the first president of the Connecticut Company section of the American Electric Railway Association, having retired from the position only a few weeks ago.

C. C. Curtis, lighting superintendent of the El Paso (Tex.) Electric Company, will assume the duties of manager of the Cape Breton Electric Company, Ltd., operating the electric railway and lighting properties at Sydney, N. S., replacing E. L. Milliken, who goes to Houghton, Mich., as manager of the Houghton County Traction Company, in place of W. L. Weston, now first lieutenant in the United States Infantry. The El Paso, Cape Breton and Houghton properties are all controlled by Stone & Webster.

Roy Ballou has been appointed chief inspector of the Denver (Col.) Tramway. Mr. Ballou has traveled far and wide. He was formerly a petty officer in the United States Navy. As such he took up as a member of the American forces in their participation in putting down the Boxer rebellion in China. He is also said to have upheld the reputation of the navy as its representative in a limited round engagement with Terrible Terry McGovern when the terrible one was in his prime.

James O. Carr, Schenectady, a republican member of the Public Service Commission for the Second District of New York, has placed his resignation in the hands of Governor Whitman. Mr. Carr's term does not expire until 1920. He desires to resume the practice of law. Before his appointment to the commission Mr. Carr was one of the attorneys for the General Electric Company. In 1916 he went abroad to study the transportation systems of France, England and Italy under war conditions.

G. A. Richardson, general superintendent of the railway department of the Puget Sound Traction, Light & Power Company, has returned to Seattle from the East. Several weeks ago Mr. Richardson was called into conference with officials of the American International Shipbuilding Company, and of the Philadelphia (Pa.) Rapid Transit Company, regarding transportation to and from the city and the Hog Island industrial development. During his absence from Seattle Mr. Richardson visited Boston, New York, Chicago and other cities.

Luzerne S. Cowles has resigned from the Boston (Mass.) Elevated Railway to accept the position of engineer in the structural division of the Stone & Webster Engineering Corporation. Mr. Cowles was born in Hartford, Conn., in 1876, and was graduated from the Massachusetts Institute of Technology in 1897 in the department of civil engineering. His practical engineering experience began in the estimating department of the Boston Bridge Works, and, after a year's travel and study in Europe, in 1899 he became associated with the bureau of elevated and sub-

way construction of the Boston Elevated Railway. He had been with this company for the last eighteen years.

Harry L. Brown, western editorial representative of the *ELECTRIC RAILWAY JOURNAL*, with headquarters in Chicago, has accepted a temporary appointment as radio engineer in the office of the Chief Signal Officer, United States Army, Radio Division, Washington, D. C. It is understood that he will have direct charge of the work of preparing literature for use as instructional material in the special radio courses which are being established at many of the engineering colleges throughout the country in co-operation with the Signal Corps. **L. E. Stibbe** of the New York editorial staff of the *ELECTRIC RAILWAY JOURNAL* will take up the editorial work in the Chicago office temporarily.

C. H. Hubbell, formerly auditor of receipts of the Illinois Traction Company, Peoria, Ill., is now connected with the First National Bank, Cleveland, Ohio, in the capacity of tax consultant. Mr. Hubbell is a certified public accountant. He was previously income tax inspector of the United States Treasury Department. As part of his work for the bank Mr. Hubbell has recently compiled a table showing concisely the application of the federal income and profits tax laws to Liberty Bonds. He had from one to ten inquiries daily in regard to these matters, and the statement which he has compiled is particularly helpful because it is compact, and reference may be made to it much more easily than to the tax laws and to the laws under which the bonds have been issued.

Richard D. Simms, treasurer of the Capital Traction Company, Washington, D. C., has been advanced from colonel to brigadier-general, in command of the District of Columbia National Guard. The new post does not interfere with the duties of General Simms as treasurer of the company. He succeeds Brigadier-General Harvey, now at Camp Shelby. Brigadier-General Simms was born in the District of Columbia forty-nine years ago and was educated in the public schools there. For twenty years he was employed in the District of Columbia government. In 1905 he resigned his position as purchasing agent of the District to become treasurer of the Capital Traction Company. Brigadier-General Simms has already served twenty-two years in the National Guard of the District, enlisting as a private in the field artillery. He was next made a first sergeant of cavalry, and later was in the infantry. He served a total of seven years as an enlisted man and fifteen years as a commissioned officer. In 1898 he was a captain in the First District of Columbia Volunteer Infantry. He served at Camp Alger, Va.; Camp Chickamauga, Ga., and at Tampa, Fla., and Huntsville, Ala. At the conclusion of the war with Spain General Simms returned to the local National Guard as a first lieutenant. He was promoted to major in 1899, and in 1909 was made a colonel. He was retired voluntarily in 1911.

E. C. Faber, Head of War Board Traffic Bureau

Man from Illinois Has Big Task of Arranging to Place Facilities of Electric Lines at Disposal of Government for Relief of War-Time Traffic Situation

To Edwin C. Faber, as traffic manager of the Traffic Bureau of the Electric Railway War Board, with headquarters in the Munsey Building, Washington, has been entrusted the big task of bringing the facilities of the electric railways of the country to the aid of the nation during the present crisis.

STARTING THE WHEELS

One of Mr. Faber's first acts as traffic manager of the Electric Railway War Board was to send to electric railways a list of questions for the purpose of assembling traffic data for the benefit of the Director General of Railroads. Mr. Faber states that under present circumstances it is the

has secured leave of absence. He has had a remarkably successful career from the time when, as a young man, he secured a clerkship in one of the offices of the Cleveland Electric Railway.

Born in 1875, twenty-six years later Mr. Faber became general superintendent of the Cleveland system, and for many years bore the distinction of being the youngest general superintendent of an important city electric railway of the United States. His success has been very largely due to his faculty of "doing things" and the persistence with which he has familiarized himself not only with the details of the particular job in which he was engaged at the time, but those of every other position within his ken. From clerk he became a timekeeper, then connected with the accounting department, of which he later assumed charge, then general passenger agent; assistant to the general manager and finally general superintendent.

After the Cleveland city property changed hands in 1902 and its former general manager, Ira A. McCormack, became general manager of the Grand Central Terminal in New York, he commandeered the services of Mr. Faber, who had an important part in connection with the electrification of the New York Central lines entering New York. This work was done by the General Electric Company and when completed, Hinsdale Parsons, vice-president of the General Electric Company, made Mr. Faber his assistant and put him at work making investigations and reports on the various electric railway, light and power properties in which the company was interested.

In 1904 Mr. Faber became general manager of the Aurora, Elgin & Chicago Railroad and vice-president of the Elgin, Aurora & Southern Traction Company. A year later these two properties were consolidated with the Cook County & Southern Traction Company and Mr. Faber became general manager of the combined properties. In 1913 he was in addition made vice-president of the company.

HELP HIM! IT'S YOUR DUTY!

Mr. Faber's very wide knowledge of the electric railway business and his connection with interurban railways admirably fit him for the new position to which he has been appointed. But Mr. Faber's task—that of taking over by the electric railways such business of the steam roads as the electric lines can handle—is one that he, unaided and alone, cannot carry out to a full measure of success. He realizes this and has said so frankly. The electric railway industry stands to gain or to lose by just the extent that it does or does not co-operate with Mr. Faber along the lines laid down by him in his original traffic questionnaire.



E. C. FABER

patriotic duty of each American citizen to bend every effort toward relieving the present traffic congestion and toward placing on the highest plane of efficiency every existing transportation facility. This will entail co-operation on the part of everyone concerned, including the public, and this must be constantly borne in mind in any consideration of the subject. It is evident that the electric railways can be used to supplement steam railroad service, thus relieving the steam roads of a considerable amount of short-haul traffic, so as to render steam road cars and facilities available for long-haul business—business which the electric railways are not in a position to handle.

WHAT MR. FABER HAS DONE

Mr. Faber is vice-president of the Aurora, Elgin & Chicago Railroad, operating more than 170 miles of third-rail and overhead electric railway out of Chicago, from which property he

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Recent Incorporation

***Davis Creek & Spring Hill Railway, Spring Hill, W. Va.**—Incorporated to construct a line from near Spring Hill to a point near the middle fork of Davis Creek. Capital Stock, \$50,000. Incorporators: R. N. Snyder, Samuel Edwards, L. P. Snyder, H. T. Smith and E. M. Surber, all of Charleston, W. Va.

Franchises

Los Angeles, Cal.—The Los Angeles Railway has received permission from the City Council to abandon its East Fourteenth and Tennessee Streets line on condition that the company will extend its West Jefferson Street line from Third to Ninth Avenue.

Elmira, N. Y.—The Elmira Water, Light & Railroad Company has asked the City Council of Elmira for a franchise to construct a line on East and West Chemung Place from Main Street to Maple Avenue, in order that a portion of the heavy traffic may be taken off the Main Street bridge.

Richmond, Va.—The street committee of the City Council of Richmond adopted a resolution recommending that the petition of the Richmond & Seven Pines Railroad to use the streets of the city under the new ownership in the same manner which they are now being used be granted.

Track and Roadway

Birmingham Railway, Light & Power Company, Birmingham, Ala.—Electric railway service has been discontinued by the Birmingham Railway, Light & Power Company on its Rugby Highlands car line, East Lake, southside, under orders from the State Fuel Administration as a war measure to save fuel.

Los Angeles (Cal.) Railway.—This company will extend its lines over Tenth Street to the private right-of-way to the new Los Angeles high school.

Pacific Electric Railway, Los Angeles, Cal.—Work is progressing rapidly on the double-tracking of the Pacific Electric Railway line between Los Angeles and Pomona.

Chicago (Ill.) Surface Lines.—The first lap of the Hegewisch extension from 108th Street and Ewing Avenue has been placed in operation as far as 118th Street and Burley Avenue. The

cars will reach the plant of the Interstate Iron & Steel Works.

Consolidated Street Railway, Strong City, Kan.—This company which operates a 2-mile horse car line between Cottonwood Falls and Strong City, will put on a self-propelled car. The track is being relaid to accommodate the heavier equipment.

Southwest Missouri Railroad, Webb City, Mo.—The contract for the construction of culverts and bridges for this company's proposed line between Baxter Springs and Picher, via Hockerville and St. Louis, has been awarded to the Topeka Bridge Company.

International Railway, Buffalo, N. Y.—The Public Service Commission for the Second District of New York, has announced a hearing to be held at its office in Buffalo on Feb. 6 in the proceeding which it has instituted to alter grade crossings by the International Railway of certain streets in North Tonawanda. The railway company, the city of North Tonawanda and other persons interested have been ordered to show cause, the commission holding that public safety requires an alteration of certain existing crossings. It is proposed that instead of crossing at grade the railway shall cross by overhead bridges, Payne Avenue, Linwood Avenue, Fredericka Street, East Fulton Street, Jackson Avenue, Stenzel Street, Ward Road and other streets in the city south of Witmer Road, which are crossed at grade including Sixteenth Street, Seventeenth Street, Eighteenth Street and Nineteenth Street.

Elmira Water, Light & Railroad Company, Elmira, N. Y.—The Public Service Commission for the Second District of New York issued an order directing the Elmira Water, Light & Railroad Company to discontinue operation of cars of certain weight over the Main Street bridge in Elmira. Steps will be taken by the company to build about 1800 ft. of new track and divert traffic to the Lake Street bridge.

Ottawa (Ont.) Electric Railway.—A report from this company states that it will reconstruct 2 miles of track.

Virginia Railway & Power Company, Richmond, Va.—In order to better the electric railway service in Norfolk, the Virginia Railway & Power Company made a proposition to the traffic committee, composed of delegates from the Norfolk business organizations, to make Monticello Avenue and Granby Street one-way traffic streets. The proposition made by the company included a better electric railway system for the Ghent section of Norfolk and a ten-minute schedule for Berkley. In order to put the proposition through without delay the company would use the Bay Shore tracks to make a standard gage system all over the city.

Monongahela Valley Traction Company, Fairmont, W. Va.—Surveys are being made by the Monongahela Valley Traction Company in the Marietta District for the extension of the company's lines into certain suburban districts. Lines will be extended to West View and Norwood, necessitating additions of about 2½ miles of track.

Shops and Buildings

Northern Electric Railway, Chico, Cal.—A new station will be built by the Northern Electric Railway near Globe.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.—Announcement has been made by the Terre Haute, Indianapolis & Eastern Traction Company that hereafter all freight shipments will be handled at the new freight house and terminal, Kentucky and Oliver Avenues, Indianapolis.

Concord, Maynard & Hudson Street Railway, Maynard, Mass.—Fire completely destroyed the carhouse of the Concord, Maynard & Hudson Street Railway at Main Street and Great Road, and all the rolling stock owned by the company with the exception of two cars. Twelve trolley cars, a snowplow and a construction car were burned together with a large amount of wire and other construction material.

International Railway, Buffalo, N. Y.—Fire completely destroyed the Forest Avenue carhouse of the International Railway on Jan. 23, together with forty-eight cars, four snowplows and sweepers and one work car. The loss is estimated at about \$500,000. For further details see page 244.

Power Houses and Substations

Northern Electric Railway, Chico, Cal.—John P. Coghlan, receiver of the Northern Electric Railway has sought an order from United States District Judge Dooling, authorizing the purchase of an additional generating unit at a price of \$37,500. In his petition Mr. Coghlan asserts that the freight traffic on the Northern Electric Railway is steadily increasing.

Pensacola (Fla.) Electric Company.—This company contemplates the erection of a 13,200-volt transmission line to the Pensacola naval station.

Interborough Rapid Transit Company, New York, N. Y.—Plans are being prepared by the Interborough Rapid Transit Company for the erection of a one-story transformer station, 50 ft. x 100 ft. on Livonia Avenue, near Rockaway Avenue, Brooklyn, to cost about \$40,000.

Virginia Railway & Power Company, Richmond, Va.—Plans have been made and application filed by the Virginia Railway & Power Company for an addition to its power plant at the foot of Twelfth Street, Richmond, to cost \$6,000.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Prevailing Conditions in Wire Market

Western Stocks in Very Bad Shape—Supplies in the New England Market Are Increasing

To some observers the future price of copper wire to the trade is a puzzle. The government has, of course, fixed the price of ingots at 23½ cents. Ordinarily the mills formerly got about 1 cent a pound for working it up. Now they get, on account of labor conditions, from 3 cents to 4 cents, bringing factory prices on wire up to 26½ cents to 27½ cents. Chicago jobbers are at present continuing on a 30-cent base for rubber-covered and a 28-cent base on weatherproof.

On the Pacific Coast rubber-covered wire stocks have been seriously depleted of late by the slowing down of deliveries without corresponding decrease in demand. Despite this condition a tendency to a lower price is reported. Weatherproof wire stocks are also in worse shape than before, but are not so bad as rubber-covered.

In New England, however, wire and cable stocks are increasing, at least temporarily. One large manufacturer reports putting the first stock order through the works for many months, covering varied sizes. Weatherproof wire is quoted at 27 cents and rubber-covered at 30 cents.

Weatherproof wire was quoted in New York as the week opened at 28¼ to 34¼ cents per pound in 100-lb. lots.

Transportation Delays Deliveries

Local Stocks of Supplies Are Feeling the Strain of Lessened Incoming Material

Storms of the past two or three weeks in the East and Middle West have crippled transportation badly. Similar congested conditions prevail on the Pacific Coast. Each week the receipts of supplies have been smaller.

As a result local stocks of many staples are diminishing and in not a few instances a very serious situation is being faced. Embargoes to the Eastern seaboard have diminished stocks of iron and steel goods. In this list are a great many products used by railways in maintenance work.

Various things are being done in different parts of the country to relieve the congested condition of the roads, but even with the saving effected it will be many weeks before any material reduction can be made in delivery time.

Besides having the immediate effect

of putting a strain on local stocks of finished products the railroad breakdown has another more lasting result.

Factories have not been able to procure sufficient supplies of raw materials in many instances and the later output of the finished product will naturally be affected.

Cedar Pole Market Exceeds Expectations

Lack of Transportation Facilities and Utility Financing Conditions—Accumulation of Large Stocks

The twenty-second annual meeting of the Northern White Cedar Association was held at the Radisson Hotel, Minneapolis, Minn., on Jan. 22 and 23. Vice-President J. E. Gerich presided in the absence of the president, J. T. Kirkpatrick, who was unable to attend owing to work in connection with the exemption appeal board at Houghton, Mich. The meeting was attended by representatives of twenty-two of the leading cedar producers. The secretary in his report, reviewing the principal activities during the year, stated that the year 1917 was marked by an extraordinary traffic in cedar products, which was much greater than was anticipated. No papers were read, the entire time being devoted to presentation of committee reports and discussions of pertinent subjects.

The pole committee reported a good supply of poles on hand, which is ascribed to a lack of transportation facilities and the inability of many operating companies to procure funds for improvements. The post committee predicted a satisfactory business for post shippers. An exceptional market for posts had not been looked for in 1917 owing to the need of increased crop production and the high costs of fencing and farm labor. From the discussion of car supply it is thought that the situation is better this year than it was last. The priority which is expected for shipments of poles to public utilities it is thought will contribute to a favorable traffic in this product during 1918. It was recommended that the work of the pole advertising committee be continued, and appropriations were made for this and post advertising.

The election of officers for the ensuing year resulted as follows: President, J. E. Gerich, MacGills & Gibbs Company, Milwaukee; vice-president, L. L. Hill, Page & Hill Company, Minneapolis; W. L. Lafean, Chicago, and J. C. Kirkpatrick, the retiring president, were elected directors. W. D. Thomas and N. E. Boucher were continued in office as treasurer and secretary respectively.

Lightning Arrester Sales Active

Reports from the South State That Deliveries Are Slowing Up—Two to Five Months Specified

Heretofore the demand in the South for lightning arresters was more or less sporadic, but expansion of transmission systems in the Southeast has tended to flatten out the demand. Manufacturers report that last week's thunderstorms stimulated sales and brought to the attention of operating engineers the necessity of anticipating summer requirements. The aluminum-cell type has been quite active, but deliveries are slowing up. Manufacturers report great difficulty in securing steel containers and aluminum. Arresters for 6600 volts and below are promised for two months. Higher potentials cannot be had in less than five months, with the possibility of even longer shipments. There has been no decided change in prices recently.

Electric Railway Credits in the Southeast

Material Manufacturers and Jobbers Aver Collections Good—Peculiar Position of Traction Properties

Manufacturers and large jobbers handling electric railway material report that collections in general show an improvement over December, with the exception of a small number of isolated cases. A few of the larger accounts with manufacturers covering heavy equipment were slow coming in during the latter part of December, but these were taken care of in the early part of January and a fairly clean slate is presented at this time.

Electric railways in the Southeast hold a peculiar position, in that the majority are consolidated and operated in conjunction with lighting and power systems or controlled by holding companies. This feature influences the perspective of the credit man. The isolated systems that are not securing any direct benefit from military transportation are traveling a hard road in the face of increasing labor and maintenance costs. On the other hand, those systems securing military patronage are holding operating ratios down and doing as well as can be expected.

There is no doubt, however, that the equipment manufacturers are following up accounts more closely, and although this may not be construed as restricting or tightening up of credit facilities, nevertheless buyers are impressed with the fact that their accounts must be

Track Material Steady but Slow

**Equipment for Maintenance and Replacements Receiving the Call—
Prices High—Certain Lines Scarce**

With manufacturers and supply dealers of minor accessories and specialties, covering particularly track materials, the market is not altogether stagnant. In fact, considerable activity is noted with houses operating in this field, when conditions are taken into account. An authority on rails, plates, bolts, spikes and general track material states prices are keeping in line with the government selling figure on pig iron. This is also true of refined iron, bar steel and angle bars. Inquiries will not come along for immediate delivery. There is a mild inquiry for such specialties, mainly for track maintenance and replacement, on the part of electric roads, but it is nevertheless steady. Track cannot last forever, according to the same speaker, and even if the electric railways are in no financial position to buy as they should there is evidence that something is moving in the supply field, and it represents a regular trade if not remarkable in volume.

The straits that some electric roads are in for track maintenance and replacement is illustrated by a company in New York State that ordered a couple of cars of rails. When en route and before arriving at their destination the rolling mill, the statement says, ascertained its customer was by no means able to pay for the goods according to the contract. Without even notifying the buyer, the rails were rerouted and forwarded to another road, which happened to be in sufficient funds to pay the bill. It is said this is not an isolated instance, although no complaint is heard, because the electric properties are believed to be doing the best they can under the circumstances. Rail bonds including special heavy bonds are deliverable inside of a month. Third-rail anchors in carloads are going forward within the same time.

Another manufacturer stated the price of copper was checking the sale

of copper bonds to a considerable extent. In the spring, however, he looked for an improvement.

The recent storms were not only crippling transportation, rendering it more uncertain than ever, but the embargoes from Pittsburgh East, though expected to be raised, will probably be renewed. Steam railroad officials declare that the weather conditions are the worst they had experienced in thirty years. There were added difficulties because of the magnitude of current traffic. The actual freight situation is not a great deal improved over what it was on Jan. 1.

PROSPECTS IN PIG IRON MARKET

The last week has witnessed an opening of the pig iron market for the second half of the year and, while the volume of business is not large, the prospects are good for some heavy buying in the near future. After the wind-up of work on last year's adjustments and accounts a general desire to buy raw material is held to have taken possession of the trade. Sales for the second half are not very specific, in cases leaving out time of delivery and price, but being specific in description of material. The price is left open, as contracts must be written with a clause adjusting the price to any that may be made later by a government agency. A bolt and spike manufacturer stated he knew of many orders for pig iron which remained unfilled on account of the embargoes. That is to say, the material was finished at the foundry, but no cars could be had for shipping. Spikes, bolts, screw spikes can be delivered in a couple or three weeks, as can also some angle bars and tie-plates. Producers are ready to ship if they had facilities.

A manufacturer of track specialties, such as clamps, guard rail braces, derailleurs, tie plates, tie rods, rail joints, etc., states he was offering 60-lb. rails, for as good a delivery as the situation would permit, although the shipment would be prompt at \$70 a ton. A lot of 1000 rails was available, however, at \$60. Also a quantity of rails made for the Russian government, but undeliverable, was on the market at a still lower price. These rails differed from the kind used on American roads slightly, but they could be adapted with little trouble. They would probably find a market, he added, with a Cuban electric road. A large order of turnbuckles for the Interborough Rapid Transit Company, New York, ordered on Oct. 24 last, has not been received yet. Everyone concerned admits it is a seller's market.

Culverts are in weak demand just now, according to sales agents handling these goods, on account of the season. Old car wheels and relaying rails are scarce and backward on delivery. High prices prevail for both. Concrete showed a shade advance with the re-

cent change in the price of cement due to the increase of lighterage charges. It is further reported that Portland cement is likely to move up at any time with a most decisive jump. There are some in that trade who think a \$2.50 price per barrel, wholesale, will be reached before the end of the year.

War Board Rulings on Scrap Metals and Licenses

Exportation of Materials Under False Declaration—Photostatic Copies of Licenses Accepted

Desiring to stop the exportation of iron and steel products which are intended at destination to be scrapped and used as scrap metals, the War Trade Board has issued a prohibitory order to that effect. Under date of Jan. 13 a formal announcement of the board states that any firm exporting articles manufactured of iron and steel, such as second-hand rails, car wheels, and other material, for the purpose of being scrapped at destination, is guilty of false declaration and subject to penalties.

Another order of the War Board, under date of Jan. 10, is a ruling that photostatic copies of the originals of licenses granted by the Bureau of Enemy Trade may be used in lieu of and will be given the same force and effect as the original licenses.

Rolling Stock

Petersburg & Appomattox Railway, Petersburg, Va., expects to buy ten new standard double-truck interurban cars in the near future.

Macon Railway & Light Company, Macon, Ga., in a rear-end collision with a freight train on Jan. 19, had a motor car destroyed by fire.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va., has six convertible cars now on order with the J. G. Brill Company, Philadelphia, Pa. The company contemplates building another electric locomotive early in the year.

Concord, Maynard & Hudson Street Railway, Maynard, Mass., on Jan. 25 had its carhouse destroyed by fire, of unknown origin, and all the rolling stock owned by the company, with the exception of two cars. Twelve passenger cars, a snowplow and a construction car were burned, together with a large amount of wire and other construction essentials.

Hudson River & Eastern Traction Company, Ossining, N. Y., on Jan. 28 had a passenger car smashed to pieces by running against a station abutment. The car slipped on ice-coated rails, ran down a steep hill and jumped off the end of the track, after a run of 1000 ft. against the station of the New York Central Railroad.

Dallas (Tex.) Street Railway Company, being in the market for a new

(Concluded from page 258)

kept up in good shape in order that the manufacturers may, in turn, take care of heavy current obligations covering raw materials, and eliminate, as far as possible, the necessity for further borrowing on short time paper. The serious problem of steam railroad financing has been removed by government operation, but the situation regarding the financing of other public utilities remains as a potential item.

Current opinion in the Southeast is that Congress will take up the subject of corporate financing in the belief that no satisfactory solution will be found that does not involve some degree of governmental intervention of control, in this way distinguishing between essential and non-essential industries during the period of the war, and diverting much-needed capital to the electric railways and other public utilities.

motor car and trailer, it was found that the car builders, according to a local report, refused to accept an order for the equipment with delivery stipulated earlier than two years. However, the needed cars—second-hand—were purchased from the Shreveport (La.) Traction Company.

Philadelphia, (Pa.) Rapid Transit Company is considering the purchase of a lot of 200 cars from The J. G. Brill Company. The additional rolling stock is needed to facilitate and enlarge transportation for the shipyard workers at Hog Island, Cramp & Sons Company and similar establishments in the vicinity of the city. The company has been negotiating with the United States government to assume the financial responsibility for the equipment, which probably will be of General Electric Company type. If these negotiations with the government to provide the funds for the purchase of these cars prove successful, they will be built and delivered on a priority basis.

Trade Notes

R. J. Morgan, formerly supervisor of sales for the American Steel Export Company, New York, N. Y., has been made assistant general sales manager.

Western Service Company, Spencer, Iowa, has been organized for the purpose of engaging in civil and electrical engineering and power-plant efficiency practice.

Crescent Electric & Manufacturing Company, Pittsburgh, Pa., recently bought the entire stock of the Pittsburgh Armature Works, thereby greatly increasing its capacity for work in that line.

Goulds Manufacturing Company, Seneca Falls, N. Y., has put into effect, beginning Jan. 1, 1918, a bonus system whereby all hourly piece work and salaried employees rated at \$40 a week or under will receive quarterly a bonus of 10 per cent on their total salary for the previous three months. This bonus is contingent upon a stipulated amount of time being put in at actual work during the year and is aimed to encourage full-time work.

C. C. Nuckols, president of the Consolidated Car-Heating Company, who at the outbreak of the war was commissioned major in the Ordnance Department, has been ordered by the War Department to report to Washington for active duty under the direction of Col. Samuel McRoberts, recently appointed head of the procurement division of the Ordnance Department. The directors of the company have relieved Major Nuckols of active duty in connection with the Consolidated Car-Heating Company. During his absence Cornell S. Hawley will have active charge of the management of the company, as mentioned last week.

Holden & White, Inc., Chicago, Ill., distributor of the air rectifier for the prevention of frozen air brakes, has installed it on the following railway systems: Omaha & Council Bluffs Street Railway Company, Gary & Interurban Railroad Company, Charles City Western Railway Company, Springfield (Mass.) Street Railway Company, Terre Haute, Indianapolis & Eastern Traction Company, East St. Louis & Suburban Railway Company, New York State Railways, Lincoln Traction Company, Mahoning & Shenango Railway & Light Company, Lackawanna & Wyoming Valley Railroad Company.

New Advertising Literature

American Spray Company, New York, N. Y.: Cooling water with sprays is the subject of bulletin No. 71.

John F. Godfrey, Elkhart, Ind.: The Godfrey coal conveyor is illustrated and described in a circular prepared by John F. Godfrey.

Westinghouse Lamp Company, New York, N. Y.: A folder showing the growth of its plants caused by the increase in the demand for its lamps.

Rubber Insulated Metals Corporation, Plainfield, N. J.: "Rimco" rubber-insulated pliers are illustrated and described in a leaflet prepared by this concern.

Walter A. Zelnicker Supply Company, St. Louis, Mo.: Bulletin 233, just ready for mailing, goes into the merits and

descriptions of air compressors and other machines.

Chicago Fuse Manufacturing Company, Chicago, Ill., and New York, N. Y.: "Union" renewable inclosed fuses for 250 volts and 600 volts are described in a leaflet prepared by this company.

National Tube Company, Pittsburgh, Pa.: "Rubber? No!" is the title of a four-page, illustrated circular, printed in colors, describing the "remarkable ductility of 'National' pipe," with specific examples.

Stow Manufacturing Company, Binghamton, N. Y.: Bulletins Nos. 101 and 102, entitled "Portable Tools of Proven Value," which will be sent upon request, contains and describes tools produced by a builder of forty-two years' experience.

Trico Fuse & Manufacturing Company, Milwaukee, Wis.: A leaflet descriptive of its renewable cartridge fuses. Seventeen features of these fuses are pointed out in this leaflet. This company has also printed a leaflet giving list prices of the fuses.

Wilson Welder & Metals Company, Inc., New York, N. Y.: Catalog No. 2, on electric welding. This book includes information on the development of the Wilson system, specifications of equipment, portable equipment, size, weight and use of electrodes and schedule of equipment, table of economies, physical tests of welded joints, economy and operation, etc.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.: Catalog A-2132 contains technical information regarding Bakelite Micarta-D gears. The distinctive features of this material for noiseless gears and pinions are listed, together with its physical properties. Methods of turning and drilling and gear cutting are described and illustrated with many halftones and drawings. Methods of attaching to the driving shaft which have proved suitable for gears of all sizes are shown and tables of pitch, teeth and other gear data are also given. There are formulas for the horsepower rating, the amount of power which can be transmitted through press fit and for calculating other variables in gear practice. It will be sent on request to the company's nearest office.

RAILWAY MATERIALS

	Jan. 23 30-33	Jan. 30 30
Rubber-covered wire base, New York, cents per lb.		
Wire, weatherproof (100 lb. lots), cents per lb.		
New York	34 1/4-38 1/4	29.25-34.25
Wire, weatherproof (100 lb. lots), cents per lb.		
Chicago	38-38.35	33.50-38.35
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.63	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.31	\$1.31
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.32	\$1.32
White lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	51	50

*Nominal.

NEW YORK METAL MARKET PRICES

	Jan. 23	Jan. 30
Copper, ingots, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	27	27
Lead, cents per lb.	7 7/8-7 1/2	7.92 1/2
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7.87 1/2	6.85
Tin, Straits, cents per lb.	\$86.00	\$85.00
Aluminum, 98 to 99 per cent, cents per lb.	34-36	34-36

OLD METAL PRICES—NEW YORK

	Jan. 23	Jan. 30
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	17 1/2	17 1/2
Yellow brass, cents per lb.	13 1/2	13 1/2
Lead, heavy, cents per lb.	5 1/2	6
Zinc, cents per lb.	5 1/2	5 1/2
Steel car axles, Chicago, per net ton	\$42.42	\$42.42
Old carwheels, Chicago, per gross ton	\$35.00	\$35.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.50	\$17.00



The Latest of All Cars

the front-entrance, center-exit

Peter Witt Cars at Syracuse, N. Y.

are equipped with

PEACOCK BRAKES

of course.

Why?

Because the Peacock Brake, with its balanced gear, roller bearing and eccentric drum, is the logical brake for them. Throughout the period of evolution of the modern trolley car, Peacock Brakes have kept pace with the changing requirements, and have given the best of service.

They are absolutely dependable.



The Eccentric
Drum

National Brake Co.

Buffalo, N. Y.

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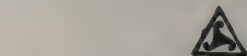
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**You Cannot Get New
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At Any Price**

Prepare to rehabilitate your track this coming spring by adopting

**The Atlantic Welding Process
Including
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This company offers the only welding equipment that uses electrical energy efficiently.

No inexcusable waste of power through banks of resistors.

No excessive fluctuation in trolley voltage.

No nuisance to the public.

No obstruction to traffic.

Less than 7 kw. hours are required to weld a Gailor joint, making it the most economical welded joint available.

For further particulars apply to our nearest agent.



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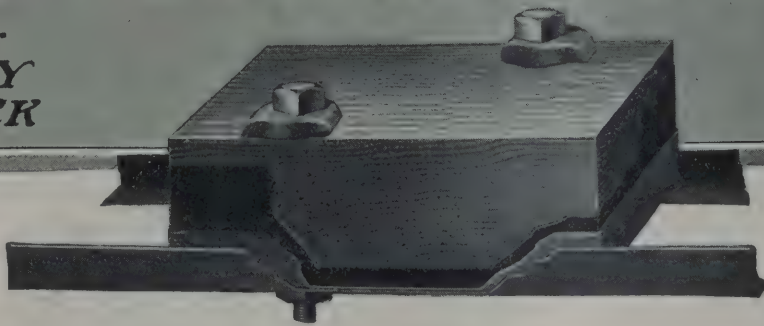
AGENTS

WIGMORE, HALL & CO., Pacific Electric Bldg., Los Angeles, Cal.
CHARLES N. WOOD CO., 14 Federal St., Boston, Mass. HOLDEN & WHITE, Inc., 343 S. Dearborn St., Chicago
W. C. BURDICK, Milwaukee, Wis., 808 First National Bank Building.
ELECTRICAL ENGINEERING CO., First National Bank Bldg., Pittsburgh, Pa.

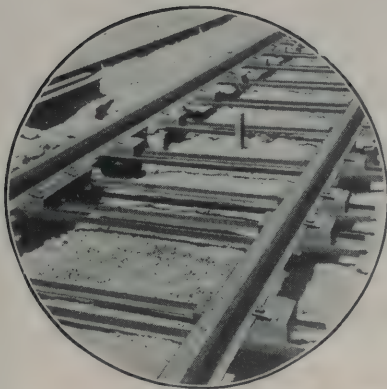
The MECHANICAL RAILWAY TIE.

*For
CITY
TRACK*

*For
INTERURBAN
TRACK*



Mechanical Ties Neutralize the Effect of Hammering of Trains on Road Bed



The above photograph shows a detail of the track recently constructed on North Jefferson St., Dayton, Ohio, by the People's Railway Co. The track is blocked up to surface and is ready for the pouring of concrete. Observe the special tie under the joint in the foreground.

Repeated blows with the tiniest tack hammer will eventually pulverize granite. And, by this same token, the vibrations of passing cars will gradually pulverize the concrete surrounding ordinary wood or steel ties. Or, in the case of wood ties, if much of the vibration is absorbed by the wood the ultimate effect is an indentation under the rail sufficient to throw track out of surface.

In the Mechanical Tie the rail rests on wood which absorbs a small portion of the shock only because the heavy asphalt cushion on which it in turn rests is so much more resilient than wood that most of the shock is conveyed to it and is all absorbed by it.

A recent test proved that a suburban car passing over Mechanical Tie track construction caused a deflection of only 1/32 of an inch, all of which was taken up by the asphalt cushion.

You will find yourself amply repaid for your trouble in investigating Mechanical Ties. Full particulars on request.

**THE
DAYTON MECHANICAL TIE CO.**

201 Third Street Arcade
DAYTON, OHIO

Provides the Desirable Qualities of Wood Plus the Strength of Steel, the Permanence of Concrete and the Resiliency of Asphalt— A NonConductor of Vibration

Atlanta's Arc Headlights
keep a-burning because of
"DELTABESTON"
Magnet
Wire



If users of arc headlights complain that the magnets burn out, ask 'em why they don't get rid of their troubles by using Deltabeston Magnet Wire.

Look at Atlanta! Uses Deltabeston No. 18 Magnet Wire exclusively for its luminous arc headlights because it has found that

**Deltabeston Magnet Wire Does Withstand
 Excessive Heat and Moisture**

Other Delta Products are Delta Tape and Delta Sheeting



D & W FUSE CO.
 PROVIDENCE, R. I.



The Morale of Your Men

MEN, guns and ammunition are necessary to win wars, but men, guns and ammunition will not win wars unless the "morale" of the men is right. What they think; what they believe; what they hope—these are deciding factors.

"Morale" is as important to an electric railway company as it is to an army. Your conductors must have more than intelligence and skill. They must have the desire to use their intelligence and skill for the betterment of the business.



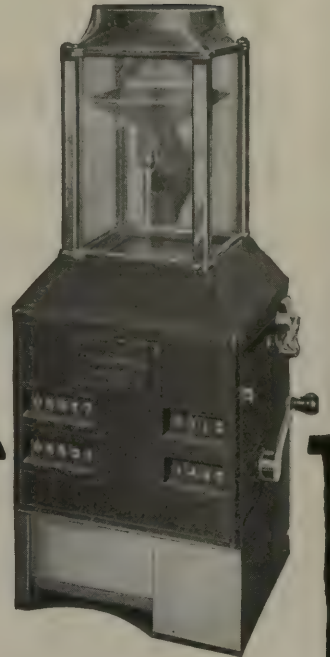
The **OHMER SYSTEM** of fare protection creates the right quality of "morale" among conductors. It supplies a mechanism for properly indicating and recording each fare paid. It offers to the conductor a real incentive to work "On the Square." It bolsters up his self-respect. It places upon his shoulders just the right amount of steadying responsibility.

Let us show you just how we would apply the **OHMER SYSTEM** to your property. You will be under no obligation to us.

OHMER FARE REGISTER COMPANY
DAYTON, OHIO.

These are extraordinary times

Conservation and Efficient Methods are imperative. Electric Railway Companies need every nickel to meet the increased cost of operation.



THE JOHNSON FARE BOX

not only gets every fare from every passenger, but saves all the money for the company.

The fare box is no longer an experiment. Engineering study of transportation has proven that Fare Boxes save from \$1.00 per day up. Read carefully this extract from the article on "Applying Engineering and Selling Principles to Electric Railway Transportation," taken from the Jan. 5th Electric Railway Journal.

Johnson Fare Boxes are rapidly becoming standard equipment on the most progressive electric railway systems. They increase cash revenue more than \$1.00 per car per day. They'll do the same for you. Let us help you get all the money you are entitled to receive.

Fare Boxes Will Get More Money

It's Not Only Good Policy to Waste Less But Also to Get Every Fare Possible

IN A REVIEW of the operations of a company recently it was found that the cars were operated without fare boxes. After investigation the management concluded if fare boxes were installed, there would be an increase of 5 per cent or \$100,000 in the gross receipts of the company, because with the present system of fare collection a large number of fares are lost either through indifference or dishonesty of passengers and conductors.

The psychological effect of having a fare box which every passenger must pass seems to be the one best way to get all the money due. The fact that a person passes the fare box means to both the person and the conductor that some fare must be put into it. If the fare is not deposited, not only the riders who try to slip by the box but others within earshot and eyeview are likely to have that fact called to their attention—a factor that helps greatly to deter theft.

Aside from its direct fare-collection value, the fare box also keeps the conductor in the proper place to give signals promptly and safely. Therefore the fare box is a logical part of our "safe speed" campaign for producing additional business. Since the conductor is at the door, he can supervise the entrance and exit of all passengers regardless of whether or not the car is empty or full. With hand-to-hand collection it is necessary for the conductor to go up in the car and depend at these times upon the passengers to inform him if the starting signal should be given or not. This is not only an element of delay but of danger also, because the passengers have not got the skill nor should they be given the responsibility to observe whether it is safe for the car to be started.

JOHNSON FARE BOX COMPANY

Jackson Boulevard and Robey St., Chicago

50 East 42nd Street, New York

The Zone System is Certain on City and Suburban Roads

The only logical way to get more revenue is to hold your present short riders while increasing the fare of the passengers on whom you are losing money.

With the coming of the zone system you will need a printed record trip by trip of the number of riders in each zone and of the rate of fares which each rider paid.

The quickest, most accurate and most economical way to get this record is with the

Bonham Traffic Recorder

The Bonham
Recorder
Company

Hamilton, Ohio

Month	Day	Train	Div.	Total Cash	Psgs.	Total Psgs.
12	07	53	3	195	57	44398
		On	Off	Miles	Cash	
			45	22	4	44
			45	22	4	44
			45	22		
			61	30		
			71	35		
			71	35	6	70
			71	35	6	70
			21	10		20
			9	4		8
			27	13		26
			27	13		26
			45	22	4	44
			45	22	4	44
		9	61	26	4	52
		9	61	26		
		9	61	26		
		9	71	31		
		9	71	31		
		9	33	12		24
		21	61	20	3	40
		21	61	20	3	40
		21	45	12		
		21	45	12		24
		21	71	25		
		21	71	25		
		21	71	25	11	50
		21	33	6		12
		21	33	6		12
		27	45	9		
		27	45	9		18
		33	71	19	3	38
		33	61	14	45	28
		33	61	14		
		33	61	14		
		33	45	6		12
		33	45	6		
		33	45	6		
12	07	53	3	19579		44435
		L. S. Harris		22		37
		Miles		685		
				Cash	7.46	
				WarTax	.45	
		Total Charge to Conductor				\$7.91
				Tickets	6.24	
		Total Revenue				\$13.70



**For every
\$100,000
Collected
2,000,000
Operations
with 78
International
Registers**

Just ONE Technical Defect

During August, 1917, the Boston Elevated Railway operated seventy-eight International Motor Driven Station Registers, which received a total of \$390,023.35.

Five defects were reported during that month, of which four were due to motor trouble and the other was caused by forgetfulness of a passenger.

Interruption to fare collection and registration was even less than this wonderful record because the larger stations do not need all their machines in action except during the rush hour.

A reliability figure like this after nearly two years' service from many of these machines proves that

**INTERNATIONAL Motor-Driven Station Registers
Are as Sturdy as They Are Accurate**

The International Register Company

15 South Throop Street

CHICAGO, ILL.

When It Pays to Advertise
By Herbert Kaufman,
 If advertising were an expedient for excess profits or a device to dispose of inferior goods, cheats and shysters would be the leading users of printers' ink.
 Honest men alone invite attention. In the business underworld, too, identifying marks are zealously avoided. From time to time knaves have unwisely attempted to prostitute publicity, but in the end the force they invoked against public interest invariably struck back and destroyed them. Misrepresentation defeats its own object. When you see firms in the trade on record year after year in the same publications, be assured that they're giving full equivalent for the money they ask.
It pays to advertise when you're right.
 Copyright, 1917, by Herbert Kaufman.

For 30 Years

Continuously

Hale and Kilburn Street Car Seats

and other

Street Car Fixtures

have been advertised in the

Electric Railway Journal

← 1887
1918 →

THE HALE & KILBURN MANFG. CO.,
 Extensive makers of Patented Street Car Seats of every description. Our Patent Spring Seats covered with Rattan or Carpet are fast being adopted by the best railroads in the country. Seats for Steam Cars a Specialty. Owners and makers of all the city patents.



Street Railway Journal
 July, 1887

Many R. R. Co's use our Rattan Pat. Car Seats for Street Cars. This is the same with carpet for winter. The method of seating is recommended as durable and economical, for the reason both a summer and winter seat is obtained in one.
 Estimates and Particulars cheerfully given (mention this paper, satisfaction guaranteed).
 A TRIAL SOLICITED.
 OFFICES: 48 & 50 NO. SIXTH ST., PHILADELPHIA, PA. Out of section of floor for summer car.

Hale and Kilburn
 No. 108, Concave Seat
 For One-Man and Other Cars

Only four parts—Steel Aisle End Support, Steel Wall End Support, hardwood-framed Rattan Cushion and Rattan Back. Note new yokeless pedestal and concave cushion

This No. 108 seat is only ONE-HALF THE WEIGHT OF SEATS WITH IRON CASTINGS.

Hale and Kilburn Co.
 Philadelphia Washington Atlanta New York San Francisco Chicago Detroit

Electric Railway Journal
 Dec. 22, 1917

When a company advertises its product month after month, for more than a generation, in the same technical paper—it must have been making good!
 Have you ever tried us out?



Hale and Kilburn Co.

Philadelphia
 Washington

New York
 Atlanta
 Chicago

San Francisco
 Louisville



The Advantages of Finished Material over “Adapted” Raw Material



Time was when car-building shops came near to being chiefly lumber yards.

Wood was used for pretty nearly every purpose in car construction and finish simply because wood was an “adaptable” material and nothing better was known.

Today finished materials properly made and scientifically designed for the uses to which they are to be put are making car construction quicker, cheaper and are making better cars.

Certainly not the least valuable among such materials are

Agasote and Pantasote

Agasote because of its ease and cheapness of application, its absolutely waterproof qualities, its high temperature insulating value, its relatively light weight and excellent appearance is the standard material in use today for roofing, wainscoting and headlining.

Pantasote advantages have been so long understood and it has been so universally used that railway men have almost forgotten the vexatious days of latticed shutters and flimsy textiles for use in shading car windows.

Chemistry practically applied to manufacture has worked marvels in many products besides textiles, steels and dyes.

The Pantasote Co.

11 Broadway, New York

People's Gas Bldg., Chicago, Ill.

797 Monadnock Bldg., San Francisco, Cal.



The MILLER Trolley Shoe

The best and last word in current collection at minimum wheel and wire cost

Hardly a year has gone by since the Miller Trolley Shoe was placed on the market to demonstrate that the principle of sliding contact so successfully used abroad—and adopted in the pantograph form for the *heaviest* work in this country—could also be adapted for

Use with Existing Trolley Poles and Bases

Today hundreds of cars on scores of railways of every character of service are using the Miller Trolley Shoe—and using it successfully through making such changes as lowering the trolley base tension and instructing platform men how to operate under special work and to back up.

Wherever the principle of the Miller Trolley Shoe has been correctly applied and fairly followed up, the user reports a life far in excess of the trolley wheel and a wire-wear that is less than it would be with a higher-tension contact that does not *lug the trolley wire as tenaciously as the Miller Trolley Shoe.*



Among the many important benefits of sliding contact obtained by means of the Miller Shoe are the following:

No smashing down of overhead and consequent breakage of trolley wire—

No arcing at spans or burning of trolley wire—

No limitation on the use of composition or steel contact wire trolley—

No bent trolley poles or bruised car roofs; and

NO TRAFFIC INTERRUPTIONS DUE TO DEWIREMENTS

Miller Trolley Shoe Co., West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

SALES REPRESENTATIVES

Alfred Connor,
Denver, Col.

T. C. White & Co.,
St. Louis, Mo.

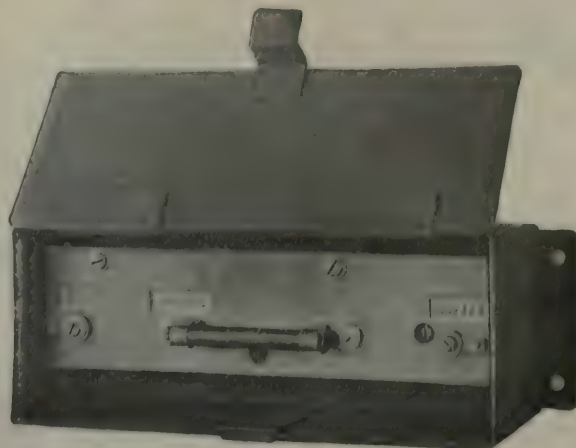
S. I. Wallis,
Los Angeles, Cal.

F. F. Bodler,
San Francisco, Cal.

W. F. McKenney,
Portland, Oregon.

W. M. McClintock,
St. Paul, Minn.

The New Consolidated Buzzer



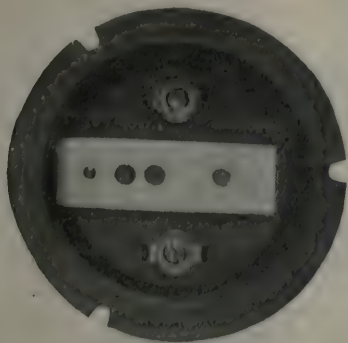
*—the last word in simplicity and economy
A child can take it apart and put it together again*



No Wearing Parts
Special Resistance
Trifling Current Operates It
Circuit Opened and Closed in
Interrupter—Not in Buzzer
No Sparking at Push Button
Approved by Nat. Board of
Fire Underwriters

The Consolidated way of placing the overhead power supply at the command of the passenger in order to signal a stop is not only more logical than to depend upon a battery, but also far more satisfactory. To you a battery means a continuing expense for replacement and upkeep; while to your passengers it means exasperation when the battery fails to convey their wishes to the motor-man.

Consolidated Buzzers will give your patrons the pleasant feeling of having their intentions promptly understood and promptly obeyed, while your men will have the satisfaction of avoiding arguments with passengers and of maintaining their schedules with greater ease.



CONSOLIDATED CAR-HEATING CO.

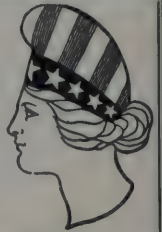
ALBANY

NEW YORK

CHICAGO



Brush-Holders



One of Many Columbia-Made Specialties

Yes, here are a few of the thousands of brush-holders that we turn out every year for electric railways throughout the land.



Columbia-Made Brush-Holders are available for any motor.

This is only one example of the kind of service we have built up to make home manufacture by railways unnecessary as well as uneconomical.

For instance, the brush-holder castings shown in this picture are for

some of the biggest electric railways in the United States.

They wouldn't be buying Columbia-made goods unless there was a saving in time and money, would they?

Give Our Service a Trial—Not Only for Brush-Holders but for Products Like These

TOOLS

Armature and Axle Straighteners
Armature shaft straighteners
Armature buggies and stands
Babbiting molds
Banding and heading machines
Car hoists
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and Axle Bearings
Armature and field coils
Bearings (Axle and Armature)
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, riggings, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail shoe beams and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y. Holden & White, Inc., Chicago F. F. Bodler, San Francisco
Railway & Power Eng. Corp., Ltd., Toronto, Can.





Modern Cars need Modern Fenders

Modern cars are judged not so much by their shiny varnish and bright, new metal parts, but by the proved excellence of their auxiliary equipment.

Look about—and when you see a new car of modern design, take note of the fender equipment. In most cases you will find the really modern car equipped with

Providence Fenders or H-B Life Guards

Why? Because they have stood the test of time and experience.

The Consolidated Car Fender Co.

Providence, R. I.

General Sales Agent

Wendell & MacDuffie Co.

61 Broadway, N. Y.



Standard for 67 Years

The Chilled Iron Wheel has performed its every function at a minimum cost.

For Freight Cars

95% of all cars in this type of service are carried on Chilled Iron Wheels.

For Street Cars

The Chilled Iron Wheel is Standard for Street Car Service in 95 out of 100 cities in the United States and Canada, operating 100 cars or over.

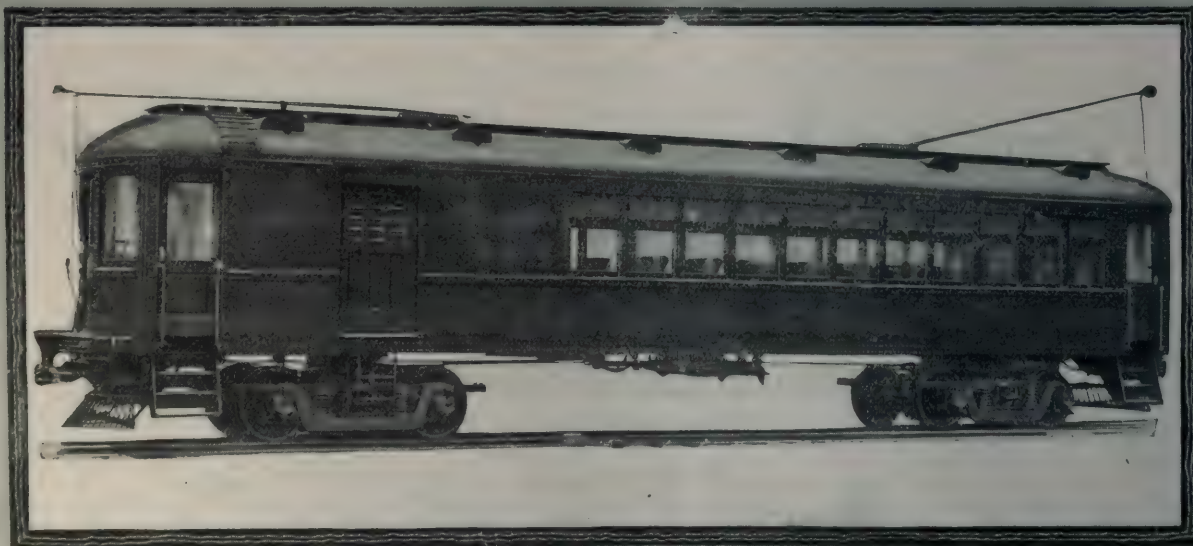
The Conclusion

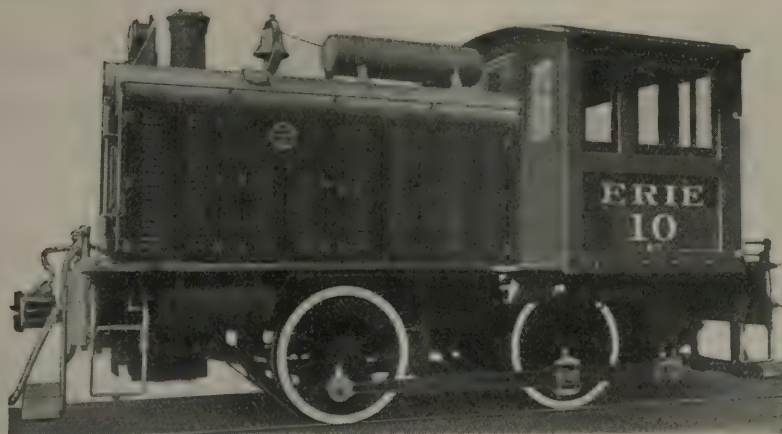
to be gained from these figures is that the Chilled Iron Wheel gives the Greatest Service for the Lowest Cost.

Association of Manufacturers of Chilled Car Wheels
1228 McCormick Building, Chicago, Ill.

Representing Forty-eight Wheel Foundries Throughout the United States and Canada. Capacity 20,000 Chilled Iron Wheels Per Day.

The
Wonderful
Single-Service
Chilled-Iron
Wheel





Gasoline Locomotives

can be run wherever a track is laid, provided clearance limits permit. They are dependent upon no external source of power, and to "charge up" it is simply necessary to refill the gasoline tank.

Electric Railways

can use gasoline locomotives to advantage, especially in and about shops, power plants and terminals. These locomotives can go where it would be unsafe or undesirable to run a third rail or overhead wire, and with reasonably careful handling fire risks are practically eliminated.

Baldwin Gasoline Locomotives

are strongly built for severe service. There are four standard sizes, weighing respectively $3\frac{1}{2}$, 5, 7 and 9 tons, which can be designed for either standard or narrow gauge; and also a 23-ton size, which is built for standard gauge only, and is specially suitable for yard or terminal switching service.

These locomotives are fully described in Baldwin Record No. 85.

THE BALDWIN LOCOMOTIVE WORKS
Philadelphia, Pa.

REPRESENTED BY

F. W. Weston, 120 Broadway, New York, N. Y.
Charles Riddell, 627 Railway Exchange, Chicago, Ill.
C. H. Peterson, 1210 Boatmen's Bank Bldg., St. Louis, Mo.

George F. Jones, 407 Travelers' Building, Richmond, Va.
A. J. Benter, 512 Northwestern Bank Bldg., Portland, Ore.
Williams, Dimond & Co., 310 Sansome St., San Francisco, Cal.



TRADE MARK
REG. U. S. PATENT OFFICE.

The Standard for Rubber Insulation

Railway Feed Wires insulated with OKONITE are unequalled for flexibility, durability, and efficiency and are in use by the leading Electric Street Railway Companies. OKONITE is preferred above any other insulation for Car Wiring, Telegraph and Telephone Purposes.

OKONITE WIRES—OKONITE TAPE
MANSON TAPE—CANDEE WEATHERPROOF WIRES
CANDEE PATENTED POTHEADS

Samples and Estimates on Application

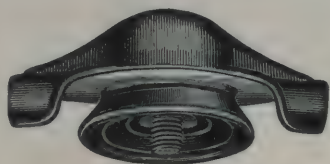
THE OKONITE COMPANY, 501 Fifth Ave., cor. 42nd St., New York

CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents

F. D. Lawrence Electric Co., Cincinnati, O.

Novelty Electric Co., Philadelphia, Pa.

Pettingell-Andrews Co., Boston, Mass.



You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

The Macallen Line

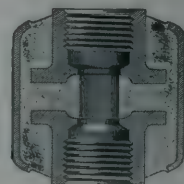
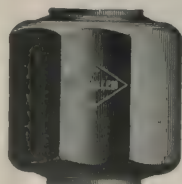
of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



May We Send Our Catalog?



The Macallen Company
Macallen and Foundry Sts., Boston



Reduce Maintenance Costs

By Adopting Quicker, Cheaper and Labor-Saving Methods

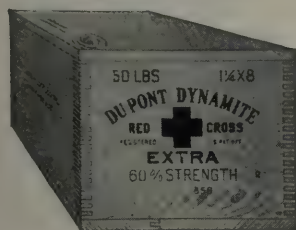
Maintenance costs are largely affected by the quantity of labor employed and the amount of time required to perform the work.

With the track and construction crews reduced by the country's call, every labor-saving agency must be employed to enable the work of track-repairing and extension to be accomplished with the remainder of the force.



By the Use of Red Cross Explosives

to blast earth, shale and gravel ahead of graders and steam-shovels; to demolish culverts, piers, log- and ice-jams; improve drainage conditions; prepare pole and post holes; shatter stumps and boulders it will be found that Red Cross Explosives are actual labor savers in a very practical manner.



Lower Your Expenses

by adoption of labor-saving methods based on the extensive experiences of our field forces while investigating the blasting operations required to construct the nation's railways. Tell us your blasting problems,—let us help you to reduce your maintenance costs. Mention ELECTRIC RAILWAY JOURNAL and send inquiry to Advertising Division.

E. I. du Pont de Nemours & Co.

POWDER MAKERS SINCE 1802

Wilmington, Delaware

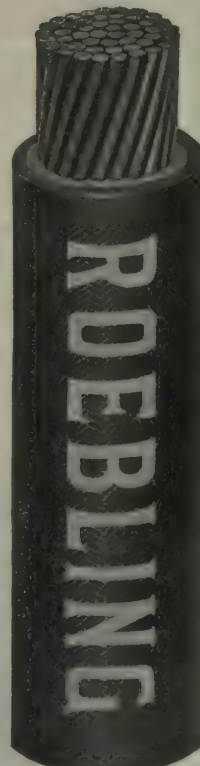
ELECTRICAL WIRES AND CABLES



Aerial Cables
Annunciator Wire
Annunciator Cables
Automobile Horn Cord
Automobile Lighting Cables
Automobile Starter Cables
Automobile Charging Cables
Automobile Ignition Cables
Armature Coils
Armature Leads
Asbestos Braided Wire
Brush Cables
Border Light Cables
Firework Cord
Battery Wire
Bridle Wire
Bare Copper Wire
Bare Copper Strands
Bare Braided Copper
Copper Wire, Bare
Copper Strands, Bare
Charging Cable for Elec. Vehicles
Copper Clad, Rubber Insulated
Copper Clad, Weatherproof
Cambric Cables
Canvaste Cord
Control Cables for Elevators
Car Wire and Cables
Cotton Tubing or Sleeving
Copper Sleeves
Copper Bells
Compound, Pothead No. 1
Compound, Splicing No. 2
Compound, Telephone No. 3
Drop Wire

Deck Cables
Electric Horn Cord
Electric Vehicle, Charging Cables
Electric Locomotive Cables
Elevator Annunciator Cables
Elevator Lighting Cables
Elevator Control Cables
Enameled Wire
Fixture Wire
Fireproof Wires
Flameproof Wires
Fire and Weatherproof Wire
Field Coils
Friction Tape
Gas Fixture Wire
Gas Engine Cables
Heater Cord
Ignition Cables
Interior Telephone Wire
Insulating Paper
Insulating Tape
Jumper Wire
Lamp Cord
Lighting Cable, Automobile
Locomotive Cable, Mine
Moving Picture Cord
Messenger Strand
Mining Machine Cables
Motor Lead Cable
Magnet Wire
Motor Boat Wires and Cables
Motorcycle Wires and Cables
Office Wire and Cables
Oilproof Finishing Braids
Power Cable, Rubber Insulated

Power Cable, Cambric Insulated
Power Cable, Paper Insulated
Packing House Cord
Paraffine Wax
Rubber Covered Wire N. E. C. S.
Rubber Tape
Starter Cables
Sweeper Cord
Spider Wire
Stage Cables
Signal Wire and Cables
Submarine Cable
Switchboard Wire
Switchboard Cords
Switchboard Cable
Slow Burning Wire
Solenoids
Secondary Spark Coils
Silk Tubing or Sleeving
Telephone Cords
Telephone Wire
Telephone Cable, Paper Insulation
Telephone Cable, Rubber Insulation
Tubing, Cotton and Silk
Telegraph Wire
Telegraph Cable, Paper Insulation
Telegraph Cable, Rubber Insulation
Vacuum Cleaner Cord
Vibrator Cord
Weatherproof Wire



John A. Roebling's Sons Company

TRENTON, NEW JERSEY

AGENCIES AND BRANCHES:

New York
Atlanta

Boston
San Francisco

Chicago
Los Angeles

Philadelphia
Seattle

Pittsburgh
Portland, Ore.

Cleveland



This is the Sherardized Yoke

that makes White's Porcelain Trolley Hanger so simple and quick to hang and align on the wire—that makes it the most economical hanger to use.

WHITE'S Porcelain Trolley Hanger

has but three simple parts—the sherardized malleable iron yoke—the heavy glazed porcelain insulator that doesn't crack or deteriorate—the standard bolt furnished in sherardized steel or bronze.

But let us send you a sample with quotations or complete hangers or parts. You can see *why* for yourself. We can make

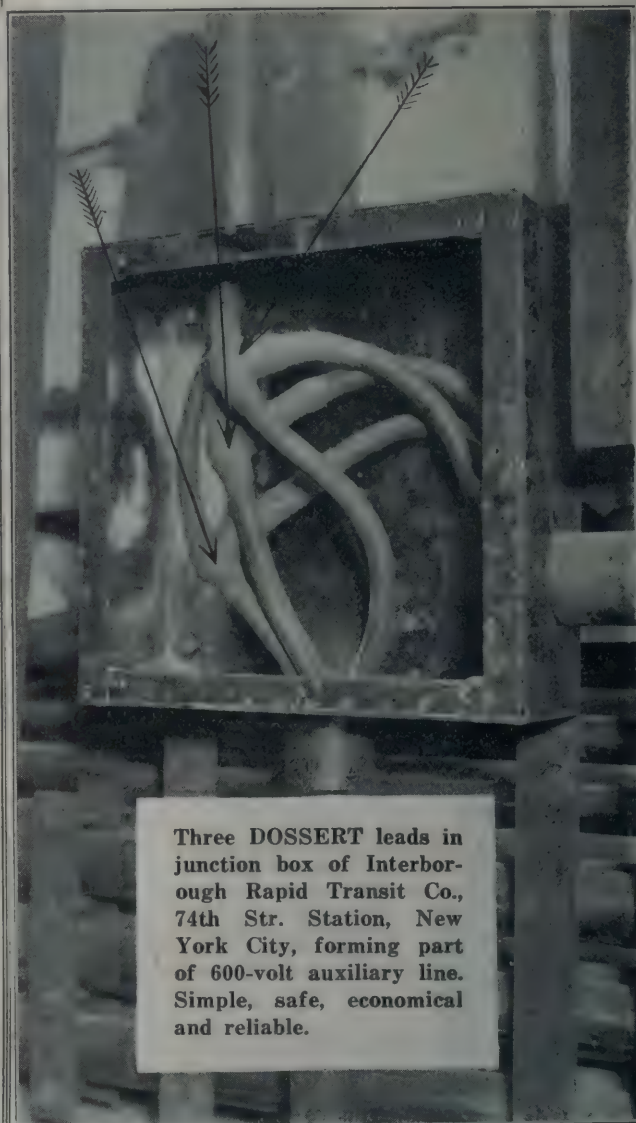
Immediate Delivery

**T. C. White Electrical
Supply Co.**

1122 Pine Street, St. Louis, Mo.



Dossert Connectors



Three DOSSERT leads in junction box of Interborough Rapid Transit Co., 74th Str. Station, New York City, forming part of 600-volt auxiliary line. Simple, safe, economical and reliable.

The Dossert solderless way eliminates liability of rubber spoilage by heat of soldering.

Our Catalog tells about it

DOSSERT & CO.

H. B. Logan, President

242 West 41st Street, New York

TROLLEY WIRE

Round Grooved and Figure 8

If you will agree that one make of trolley wire is able to give longer service than another make—

That one is more economical than another—

Then investigate our trolley wire with a view to cutting your wire costs.



Weatherproof Wires and Cables

Star Brand

Star Brand Wires are made with long service as the most prominent feature.

Because of their ability to render long service they cut wire costs.

Read the words in the cut of the star.

American Electrical Works

NEW YORK: 165 Broadway
CHICAGO: 112 West Adams Street
BOSTON: 176 Federal Street

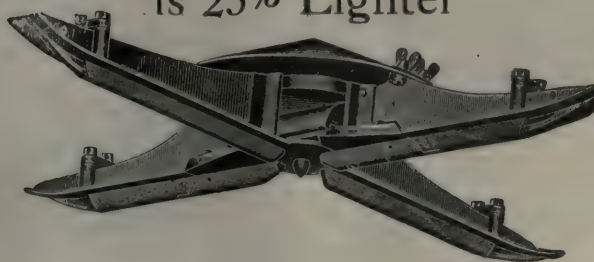
Phillipsdale, R. I.

CINCINNATI: Traction Building
SAN FRANCISCO: 612 Howard Street
SEATTLE: 1002 First Avenue South

3105

Anderson Sheet Steel Insulated Crossing

is 25% Lighter



than other Metal
CROSSINGS

Strong,
Made of
Homogeneous
Sheet Steel.

Renewable
Insulated
Runways.

Protected
Against
Blows.

Write
for
Catalog
No. 8.
Tells all
about our
Line Materials.
Standard
with many
Roads.
Copy on
request.

ALBERT & J. M. ANDERSON MFG. CO.

289-293 A STREET, BOSTON, MASS., U. S. A.



NEW YORK
135 Broadway

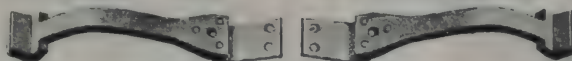
PHILADELPHIA
429 Real Estate Trust Bldg.

CHICAGO
105 S. Dearborn St.
LONDON, E. C., 48 Milton St.

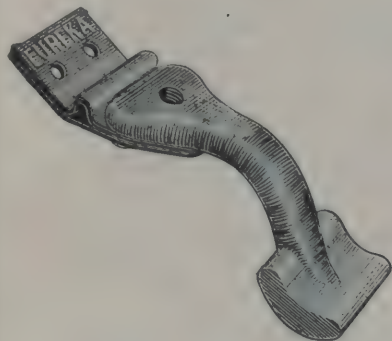


THE EUREKA CO.

NORTH EAST, PA.



Controller Contact Fingers



Made of hard-drawn or drop forged copper. Finger springs made from especial alloyed rolled phosphor bronze sheet. All Standard parts shipped from stock; special shapes and sizes made to order.



We also manufacture commutators, Brush Holders, Trolley Wheels and Sleet Cutters, Bearings and Bushings, Copper and Bronze Forgings and Castings, Line Materials, etc.

MANUFACTURED BY
THE EUREKA COMPANY
NORTH EAST, PENN'A

Write for Catalog covering materials wanted. Information and estimates gladly furnished.

RIMCO Rubber Insulated PLIERS

Every Pair Tested to 10,000 Volts

*The ONLY
Pliers so
Protected*

Special precautions should be taken in high tension work. Pliers that are protected by detachable soft rubber handles are not satisfactory, and hard rubber cracks when dropped from a height.

Rimco insulation is semi-soft and unbreakable.

Rimco pliers are cheaper than plain pliers with adjustable rubber sleeves.

Rimco pliers last longer than any hard rubber insulation can last.

Ask us for prices.

The Rubber Insulated Metals Corporation

Sole owners of the Elchemco Process for bonding rubber to metals, protected by American and Foreign Patents.

Plainfield, N. J.

SALES AGENTS

Electric Service Supplies Co., 17th & Cambria Sts., Philadelphia, Pa.
National Railway Appliance Co., 50 East 42nd St., New York City

Canadian Agent: Lyman Tube & Supply Co., Ltd., Montreal, Toronto and Winnipeg





Protected Six Years

Chief Engineer Waggoner of the Indianapolis & Cincinnati Traction Co. tells about an interesting experience with Dixon's Silica-Graphite Paint at the Rushville, Ind., plant.

"Six years after the first coat we put on the second in 1913. Today the smokestack is in a splendid state of preservation.

"We have used Dixon's Silica-Graphite Paint very extensively, not only for exterior work, but also interior—upon the metal structure of the building, coal bunkers, breechings, boiler fronts, etc., and after years of application we find at this time no complaint whatever regarding the service received from this paint."

DIXON'S Silica Graphite PAINT

never fails to satisfy users. For over fifty years, wherever protective paint is used, Dixon's Silica-Graphite Paint has demonstrated its economy because of long service.

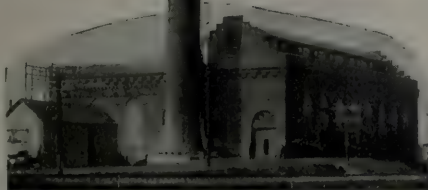
Depending on a single coat for six years is somewhat like overloading a light truck. We believe that better results are obtained if the second coat is applied as soon as the first coat is thoroughly dry. Therefore, Chief Engineer Waggoner has in his way demonstrated the protective quality of Dixon's Silica-Graphite Paint.

Ask for Paint Booklet No. 108-B

Made in JERSEY CITY, N. J., by the
Joseph Dixon Crucible Co.

Makers of Dixon's Graphite Lubricants for Gears, Transmissions and all moving parts.

Established 1827



STOP!

Turning Down Your Commutators

YOU can now resurface them with the machines in service—carrying load!

At last here is a device that works, is guaranteed to work, and is working in many of the largest electrical plants in the country.



The Ideal
Commutator
Resurfacer

—is non-metallic, non-copper collecting—therefore will not cause short-circuiting, collect copper dust, or wear smooth. It CUTS—and cuts fast! With it any operator can speedily cut down high mica ridges, or high bars; can smooth out grooves and low spots—with the machine in service!

A new, better, cheaper way to put your commutators in smooth, excellent working condition—and keep them so.

Prove it yourself without any expense. Clip the coupon and mail it today.

Remember the trial is at our expense.

Ideal Resurfacers are made in all sizes, fine and coarse grades. Convenient handles regularly supplied facilitate their use on commutators of any size.

AGENTS—Ideal Commutator Resurfacers are in great demand wherever electrical machinery is used. Write for details of our attractive dealer proposition.

Ideal Commutator Dresser Co.

10 South Dearborn St.
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10 DAY TRIAL OFFER

**Ideal Commutator Dresser Co.,
10 So. Dearborn Street, Chicago, Ill.**

Send us on ten days' free trial an Ideal Resurfacer for the commutator specified below. Should it not satisfy us in every way, we will return it at your expense. If satisfactory we will pay for it.

Commutator R.P.M. Face Width
Clearance Between Sets of Brushes
General Condition
Person Position
Firm
Address

A Simple Welder



The Lincoln Bonding Machine is a traveling repair shop.

As shown, the operator takes the machine to the work, which may be a broken rail in the country, broken parts in the yard, or reclaim work in the shop.

This is all extra to bonding. As a bonding machine, it gives a better joint in the least time, and does not require any preparation to do its work.

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AGENTS.

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*Repeat Orders Are Always the
Best Proof of Satisfaction*

Reciprocating Track Grinders

Sell Themselves—Wherever we have sold one Reciprocating Track Grinder and the amount of trackage has warranted it, we have received orders for additional machines. Their performance gives positive satisfaction under all conditions.

Use Unskilled Labor—With the Reciprocating Track Grinder rails can be ground rapidly and accurately by untrained, ordinary workmen, to a degree of smoothness, which is equal to that of newly laid track. No minute adjustments are necessary.

Write for full particulars.

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B. R. T. Elevated Station, Brooklyn, N. Y.

JOHNS-MANVILLE TRANSITE ASBESTOS WOOD

YOU can pick out many places around a power plant where the service demands material part structural and part electrical. Masonry is unnecessarily heavy—while the purely dielectric materials lack the requisite mechanical strength or are over costly.

But between these two extremes there is now a serviceable, practical mean—Johns-Manville Transite Asbestos Wood, light in weight, tough, strong, and highly fire-resistant. If barriers of this material guard your oil switches, you can isolate fires and localize the damage. The same holds true for your high potential doors, barriers, runways and partitions, for circuit breaker barriers, and bus bar separators.

For special requirements Johns-Manville Transite Asbestos Wood can be readily sawed and shaped with wood tools, nailed or screwed in place, and takes a handsome hardwood finish.



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Yale Spur-gear Block handling heavy cast iron pipe.

Yale Hoists

**Ease labor—
increase efficiency**

The Yale Spur-gear Block conserves the time and energy of the operator—lessening the effort required to handle materials to and from machine; increasing his working capacity, assuring his safety.

The Yale Spur-gear Block adds to the output of each machine, saving time in each operation of placing and removing the job—adding to production capacity of the individual worker and the machine.

The purchaser of the Yale Spur-gear Block is furnished with a certificate that each block has been tested and approved under a working load of 3360 lbs. to the rated ton. The guarantee is in the block itself.

For Sale by Machinery Supply Houses

Put your hoisting problems up to us

ASK FOR NEW CATALOG

For factory locking equipment
use a Yale Master-key System.

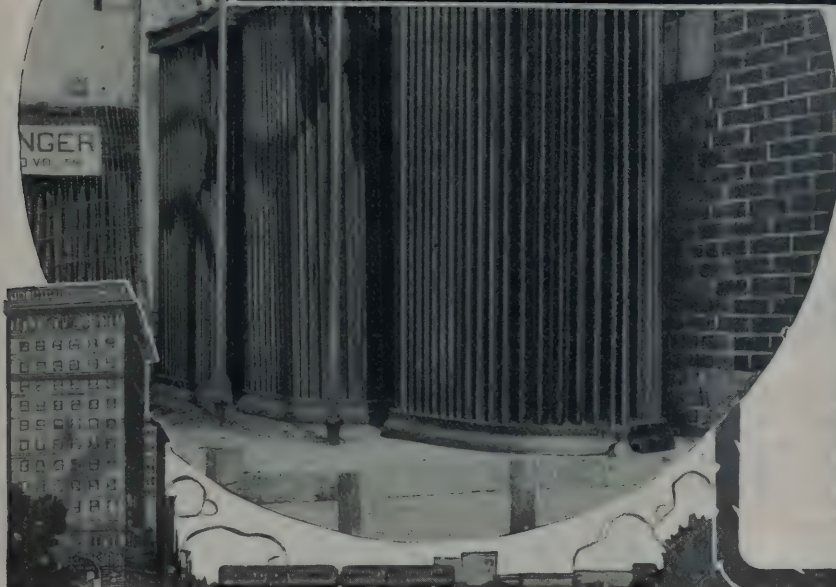
Write us for particulars

**The Yale & Towne
Mfg. Co.**

9 East 40th Street
New York

The Yale
Spur-gear Block

Packard



Public service corporations are generally careful buyers. It is significant, therefore, that so many of the large public utilities as well as numerous smaller ones are equipping with Packards.

The illustration shows 3 of the large Packard transformers which are rendering highly efficient service for the Continental Motors Co., on the Detroit Edison Co.'s System.

Write for Transformer Bulletin ERJ 200

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Electric Company

Represented by: Electric Appliance Co., Chicago, Dallas, New Orleans, San Francisco; Post Glover Electric Co., Cincinnati, Ohio; N. L. Walker, Raleigh, N. C.; H. I. Sackett Electric Co., Buffalo, N. Y.; Electric Service Supplies Co., Philadelphia, New York, Chicago; Charleston Elec'l Supply Co., Charleston, W. Va.; Frank Riddon Co., Boston, Mass.; Braid Electric Co., Nashville Tenn.; Burton R. Stare, Seattle, Wash.

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Lifts the Load without Straining Men or Hoist Parts

THE operation of a Ford Tribloc Chain Hoist is so smooth that the men themselves are surprised at the ease and speed with which they can lift the heaviest loads.

Without the least strain or tugging, one man with a mere 82 lb. pull on the hand chain can lift a ton, and while lifting he doesn't have to stop or jerk the hand chain free of the block, for the LOOP Hand Chain GUIDE absolutely prevents "gagging." It prevents straining or damaging of the hoist working parts—parts that are particularly able to withstand rough usage because they are made of steel.

If you want to prevent strains of your men and your pocketbook lay stress on the make of hoist. Specify the FORD—the only chain hoist with a five-year guarantee. Ask for a Catalog.

Ford
of Philadelphia

FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street Philadelphia, Pa.

"They Grind Faster—and Last Longer"

is the report of the operator of this track grinding machine in speaking of NORTON ALUNDUM grinding wheels.

After years of experience in this particular work, he uses NORTON wheels exclusively and will have no other. In the picture shown a 24 N ALUNDUM wheel 9 x 2½ x 1" is turning out work satisfactory in every respect.

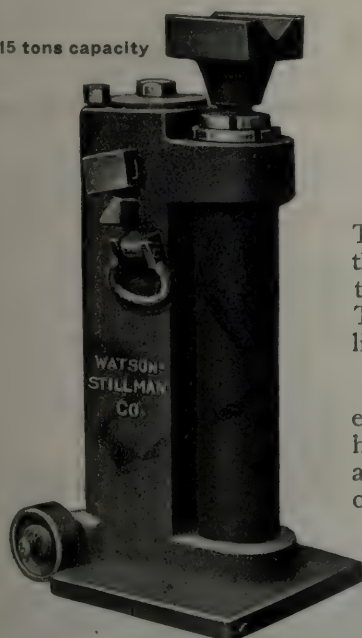


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Electric Furnace Plants	
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(912)	



15 tons capacity



HYDRAULIC JACKS

With Telescopic Rams

For Use Especially in Street Car Shops for Removing Motors, Trucks, Etc.

The demand for a low jack with long lift has led to the manufacture of this tool. The small wheels mounted on the base of the reservoir permit the jack to be handled easily when tilted at an angle. These jacks are built in capacities of 10 and 15 tons with lifts of 33 inches.

This motor lift has broad rollers for easy movement about the floor; the height when down is only 32 inches, with a lift of 37 inches with a lifting capacity of 3000 lbs.

Write for catalogs of jacks, pumps, benders, shears, bending presses, punches, etc.

The Watson-Stillman Co.

Engineers and Builders of Hydraulic Machinery

46 Church St., New York

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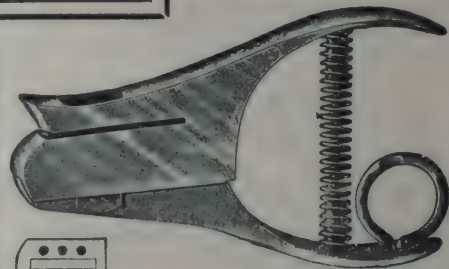
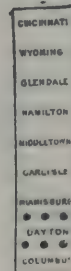
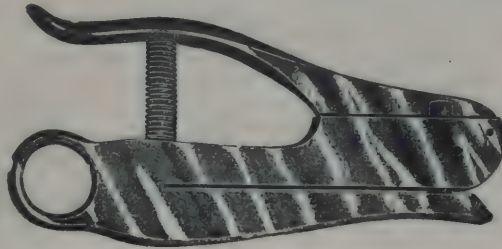
3000 lbs. capacity



B-V Ticket Punches

The Standard
in the United States
and Foreign Countries

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On Electric Railways from Atlantic to Pacific

You will find Bound Brook Graphited Oil-less Bearings on practically every important electric system in the United States.

The service they are giving is universally good—a long service that permits lower cost of operation.

That, by the way, is the reason why so many of our electric roads use nothing but

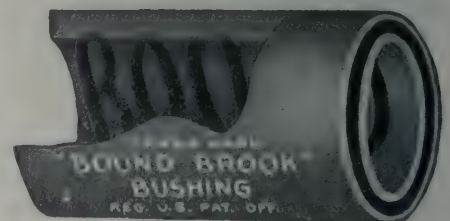
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Bound Brook Graphited Oil-less Bearings

Reg. U. S. Pat. Off.

on their trolley wheels. They find that their trolley wheel troubles have been so greatly reduced and trolley wheel mileages so greatly increased that they have no desire to use any other than Bound Brook Bushings.

Genuine Bound Brook Oil-less Bushings are made at Bound Brook, New Jersey by the



Bound Brook Oil-less Bearing Co.

Formerly Graphite Lubricating Co.

FABRIKOID SEATS

Cost Less and
Wear Better
than Split Leather

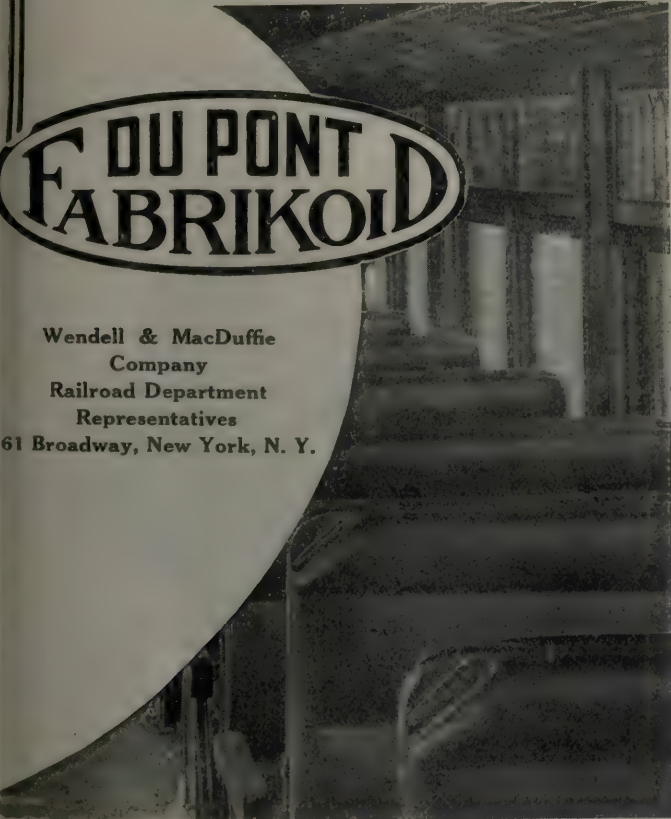
Waterproof — grease proof — stain
proof—washable.

Uniform in width, thickness and
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Easily applied—very little waste in
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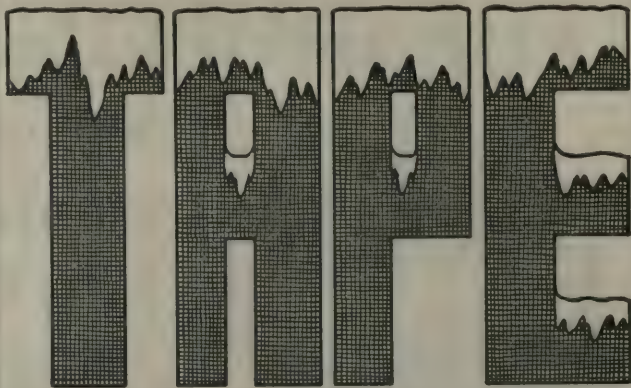
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From frigid cold to intense
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THE GRIFFIN F. C. S. WHEEL

is an improved
**Chilled
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Their constant use on a large number of street and interurban railways throughout the country demonstrates their superior qualities.

The chilled tread surface contains three and one-half per cent carbon white iron—is harder than tool steel and capable of long wear.

All of our foundries have adequate facilities for promptly refitting wheels and axles.

Our large output insures prompt deliveries.

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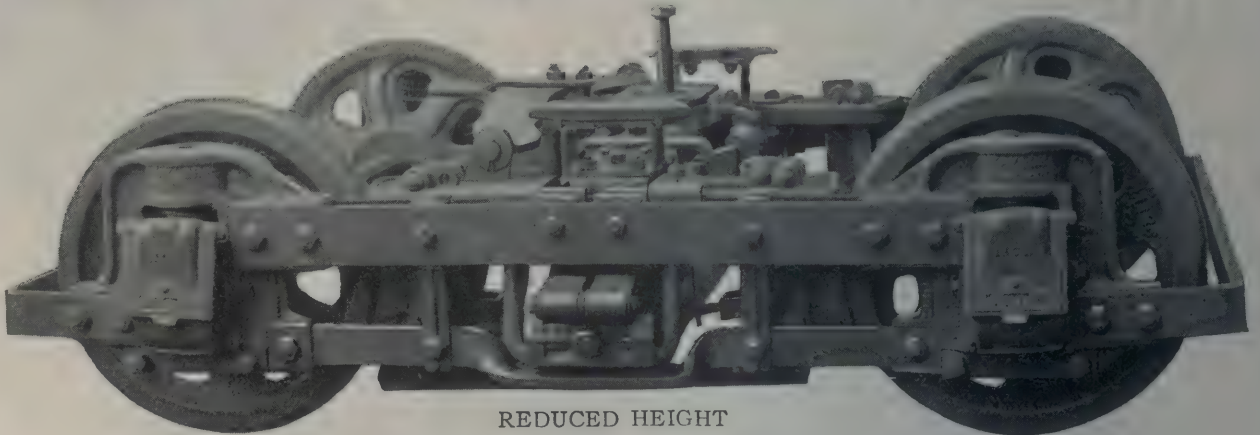
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REDUCED HEIGHT

TAYLOR R. H. TRUCK

Mounted on 26 Inch Wheels With Springs Over Journal Boxes
Designed to Mount Centre and End Entrance Cars Low Down

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car
Bodies weighing 16,000 to 22,000
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EASY
RIDING

Journals $3\frac{3}{4}$ x 7 M.C.B. Type.
Height from Rail to Body Bolster,
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Established 1892

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For High Speed Operation

—Large Diameter Kalamazoo Trolley Wheels



As a solution to arcing and short wheel life on high speed electric railway work, two new Kalamazoo Wheels have been designed.

They are (No. 20) 11½ inches and (No. 21) 10 inches in diameter. An ample increase of width, depth of groove and length of hub insures a well-balanced wheel in each case.

Tests covering considerable mileage at high speeds show that these two new "Kalamazoops" greatly decrease sparking, while offering longer wheel life. There is more bearing on the wire, with consequent greater contact and current carrying capacity.

The patented Kalamazoo Harps have been enlarged to carry these wheels.

Try several on your lines. Compare their service with that of smaller wheels.

Write Today.

STAR BRASS WORKS
KALAMAZOO, MICHIGAN

High Speed!



Bayonet Trolley Harps and Sleet Cutters are our pride. We have spared no effort in experiment and improved manufacture to produce Trolley Harps that are superior in durability, conductivity and time saving convenience.

Self-Lubricating. Non-Breakable. Poles Changed in One Minute.

Bayonet Anti-Friction Base has all wearing parts bushed.



Ten seconds only required to change complete Bayonet Trolley harp and wheel by hand. Repairs made at the bench instead of on the pole.

The Bayonet Trolley Harp Co., Springfield, Ohio

Please send me particulars of your Trolley Equipment which I would like to try out on one of my company's cars in accordance with your 60 days approval plan.

Name Address Company Date

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & North-western Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



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Pins and
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the earnings



Hundreds of thousands of Boyerized Pins and Bushings used by Electric Railways each year are a big testimony to the need of Boyerized Products and their value.

Boyerized Pins and Bushings have strength and life. They are case hardened.

They are big assisters in "safety" movements.

They are staunch guardians of the earnings.

Install them on a performance basis

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"A" FRAME

transmission structures on
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from Keene to Marlboro
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Three No. 2 stranded
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Standard span, 400 ft.

Maximum, 600 ft.

38 ft. to low wire.

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Strongest STEEL POLE of like weight in the world.
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Most artistic STEEL POLE in the world for any service.

We make the lowest prices.
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A full line of convenient malleable fittings.

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in a maximum degree to the insulation of lead-covered cables against moisture, etc., is a condition precedent to uninterrupted service. The cable ends require the same degree of protection as the joints in the manholes.

STANDARD

D. O. A. and D. S. Cable Terminals

provide the greatest degree of protection and ease of installation at a reasonable price. Their many exclusive and patented features have been developed during our 35 years' experience in the manufacture and installation of lead-covered cables of all kinds.

Bulletins Nos. 700 and 710 give valuable engineering data about terminal installation.

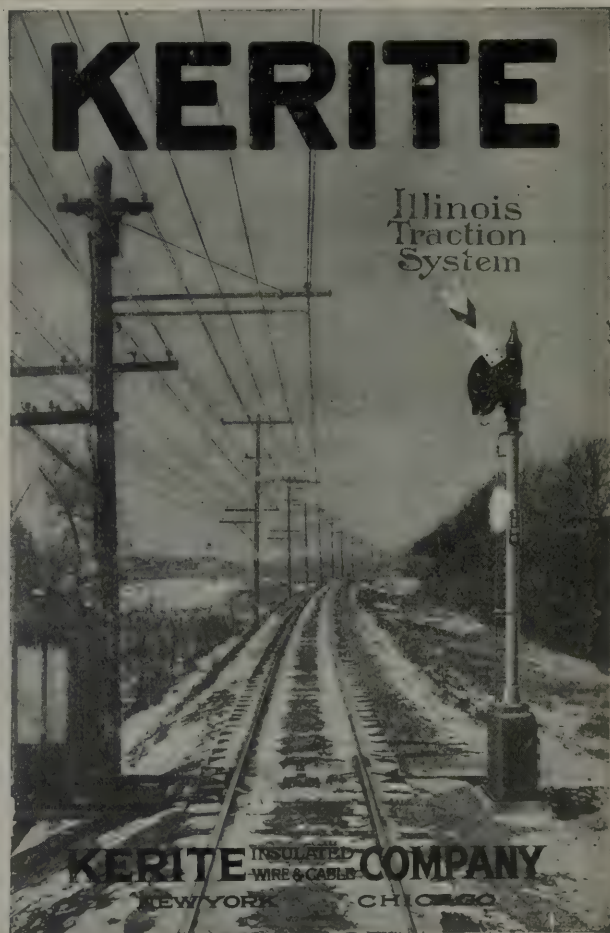
Write our nearest office.

Standard Underground Cable Company Pittsburgh, Pa.

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KERITE

Illinois
Traction
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Make a low,
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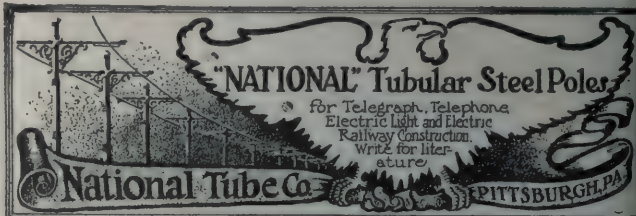
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CONSULT OUR ENGINEERS' ON YOUR
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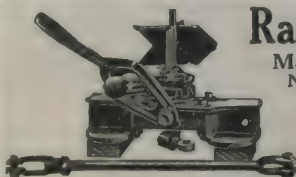
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Fibre Track Insulation

DIAMOND STATE FIBRE CO.

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It's Safe if You Used a
ROLLER LOCK NUT



It's the only self-tightening nut on the market. Use it as often as you like, but be sure you always use a *Roller Lock Nut*.

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some sort of provision for drainage. From the standpoints of time, labor, economy, convenience and permanence the best solution for the problem is

"ACME" (NESTABLE)

Corrugated Anti-Corrosive  Galvanized Culverts

Furnished either Set-up or knocked-down as desired. The transportation of these Culverts, in nested form, is easy and the placing can be handled very quickly by average laborers.

The job is permanent, too, for NO-CO-RO METAL is 99.90% pure iron and resists rust.

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MANUFACTURERS
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SPECIAL TRACK WORK
Built to withstand
severe service



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FROGS
CROSSINGS
and
COMPLETE
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Established 1858

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Special Work for Street Railways
Frogs, Crossings, Switches and Mates
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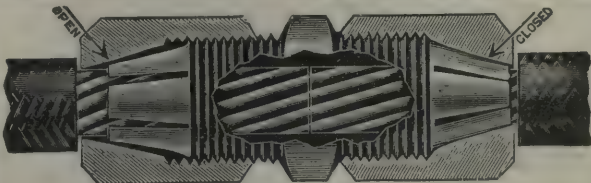
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TRACK SPECIAL WORK



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Makes Splices Easy to Open Up, Too

All you need is a wrench to open up a splice or make it up again, if you use

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The subject is one that cannot be dealt with adequately in the limited space of an advertisement.

This booklet explains *the causes of Corrosion, Incrustation, Foaming and other troubles, and offers a scientific solution of these difficulties.* We believe it will make you realize more fully than you do already, how destructive of boilers and boiler efficiency untreated feed waters may be.

We believe a study of the booklet will also convince you that we are capable of dealing with the proposition in the most effective manner, and we hope that you will fill out the card at the back of the booklet and send to us with a gallon sample of your boiler feed supply for our analysis and proposition.

Let us have your address and the booklet will be forwarded at once.

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For Protection Always
But we have made

TURBOIL

TRADE MARK
AND



GAS CYLINDER OIL

The most popular
**POWER-HOUSE
WORDS**

because they carry

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SHIPS—SHIPS—SHIPS
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Now Think About It
We cannot get those Ships
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This War
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for all classes of electrical construction and repair
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New inventions developed, perfected
and worked for the English market

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Tongue Switches, Mates, Frogs, Curves and
Special Work of all kinds for Street Railways

Full power with
High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency
Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

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Jack Mfg. Co.
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We specialize in the
manufacture of
**High Grade
Motor and
Generator Brushes**
For Railway Equipment

and for all other types of
electrical machinery and are
in position to make prompt
deliveries.

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GRAPHITE COMPANY
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In Time of Need

“Union” Fuses prove their worth by giving real protection to your apparatus, for they are accurately rated and carry the underwriters’ label service—the last word in thorough and impartial inspection.



A large saving can be effected by returning blown knife-blade fuses to our factory for reloading under the approval of the underwriters.

Catalog 28 contains complete descriptions of fuses and cutouts for railway service. Write for a copy.

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CHICAGO NEW YORK



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Insure uniform superheat at temperature specified

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CONSERVES energy
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Black varnished Cambric, Linen, Silk, Canvas, Duck & Papers, Flexible, efficient under high temperature.

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Linseed oil treated Cambric, Linen, Silk, Canvas, Duck and Papers. High puncture voltage, long life.

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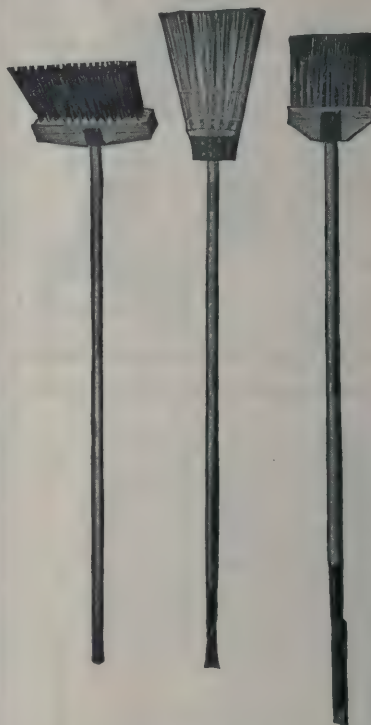
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No. 1 to sweep crossings.

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No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

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Because of the dense, high conductivity hard-drawn copper we put into the bars.
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Because of the Cameron ideal of quality—and the painstaking inspection that guarantees it in every job we turn out.
Specify CAMERON for commutators, segments or coils.

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Representatives: Chicago—E. P. Bartlett, 1368 Grand Ave.
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are produced according to the specifications laid down by Railway Motor Manufacturers. Popular with manufacturers of motors because always right as to width and thickness of material, breaking strength, yarns, warp ends, and other standard requirements. The prices and material invariably satisfactory.

HOPE Brand for best results

Webbings and Tapes made from the best raw materials—made with the most up-to-date machinery and most reasonably priced. That's what you get in Hope Products.

Send for samples.



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Machinery
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Our forty years of successful punch making are well demonstrated in the perfection of our product, which is Standard throughout the world.

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The most durable tape made.

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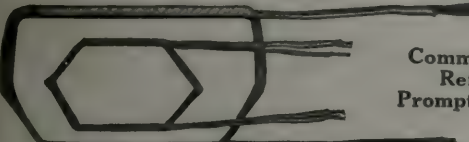
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Saved from the Ashes as many tickets are, means nickels loss to you. Avoid the risk.
Patten Ticket Destroyer is used right in the office under the eyes of trustworthy employees.
It mutilates beyond redemption.
Scrap sold will pay for the machines.

Ask us for Circular J.
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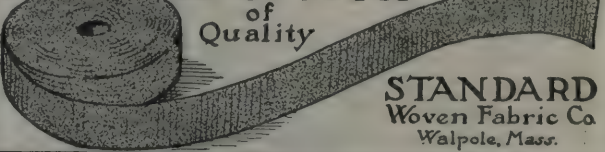
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Prompt Service

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INSULATING TAPE



STANDARD
Woven Fabric Co
Walpole, Mass.

The Cleveland, Alliance & Mahoning Valley R. R. Co.
CASH FARE RECEIPT.

Good for one continuous passage between stations notched and for this day and train only.

A tax of eight per cent in addition to the regular fare in excess of 35 cents will be collected after November 1st, 1917.

Retain this receipt until you leave the car, otherwise you may be called upon to pay an additional fare.

E. J. Fisher
General Manager.

PATENTED THE MACDONALD TICKET & TICKET BOX CO., CLEVELAND, O.

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.10	LEXINGTON RD.	.10
.15	LIMAVILLE	.15
.15	HENRYS	.15
.20	ATWATER	.20
.25	MOFF	.25
.30	EDINBURG	.30
.35	ROOTSTOWN	.35
.40	WATER WORKS	.40
.45	RAVENNA	.45
.50	N. MILFORD RD.	.50
.55	KNAPP ST.	.55
.60	CHARLESTON	.60
.65	SEIDL	.65
.70	WAYLAND	.70
.75	EVANS	.75
.80	WILCOX	.80
.85	NEWTON FALLS	.85
.90	McCLURES	.90
.95	STOP 26	.95
1.00	LEWIS RD.	1.00
1.05	LEAVITTSBURG	1.05
1.10	AUSTIN AVE.	1.10
1.10	WARREN	1.10
	DUG	
	BAGGAGE	
	EXCESS FARE	

War Tax Collections

are taken care of automatically where the Macdonald Cash Fare Receipts are used.

The illustration tells the simple story. Issuing these receipts with Macdonald boxes is as simple as tearing a piece of paper.

Send for Sample Holder.

The Macdonald Ticket & Ticket Box Co.

Cleveland, Ohio



You will buy

CLEVELAND Fare Boxes

Eventually—

Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO

WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.

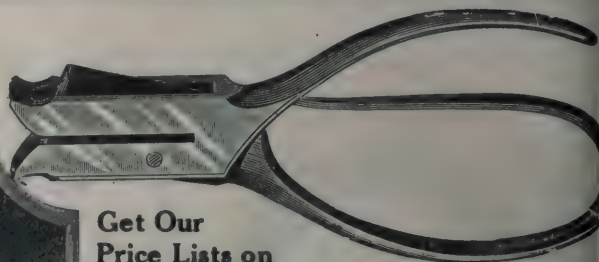
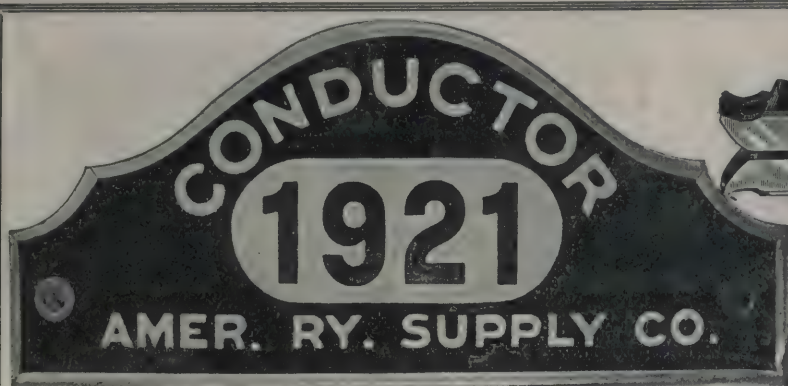
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THERMOSTATS Save Current.

ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.

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LET US FIGURE ON YOUR NEXT REQUIREMENTS
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UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

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Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

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The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature *Stewart Hartshorn*

HEATING AND VENTILATING YOUR CARS is the problem to-day. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

Trolley Wheels



Order
to-day



NUTTALL Trolley Wheels are made of new phosphor bronze—no scrap used. Their design combines the maximum of material for the longest life without enough weight to cause sluggish trolley action and of sufficient hardness to stand long wear without injury to the wire. Because of the design of the groove, ruts will not be worn in it nor will it bind the wire.

For ordinary applications, wheels are equipped with graphite bushings, but in high-speed wheels these are supplemented by oil chambers cored in the hub.

NUTTALL
PITTSBURGH

HENSLEY Fool-Proof Trolley Harps



prevent the trolley wire from lodging anywhere but in the proper wheel slot.

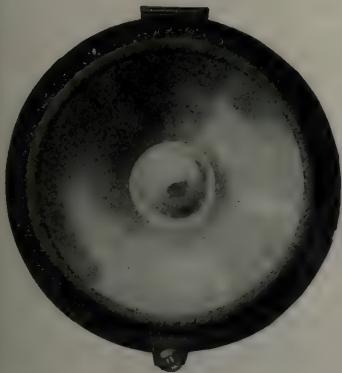
In darkness and snowstorms there can be no mistake about it:

If the pole does not jump up on release—you're sure it's on the wire right!

Of course, the best protection against trouble is a Hensley Harp on a Hensley Wheel.

Hensley Trolley & Mfg. Co.
Detroit, Mich.

The McLain No. 25 Headlight



gives powerful road illumination, at the same time eliminating glare. It is an extended dash type light made of Pressed Steel throughout, assuring light weight without any sacrifice in strength or durability. It is absolutely waterproof, weather proof and solid.

Concentrated filament type using either a 23 or 36 watt lamp. It's the **LIGHTEST, BRIGHTEST, TIGHTEST** headlight on the market and it doesn't cost any more than the others.

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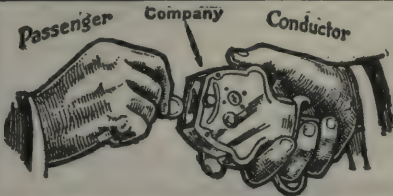


MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
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**Snow Scrapers for All Types of Cars
That Make Good Absolutely**
Prompt Delivery
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See the Crank of the
CREGHEAD DESTINATION SIGN
By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.
CREGHEAD ENGINEERING CO., CINCINNATI, O.



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Automatic
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By the
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**Rooke Automatic
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GURNEY BALL BEARINGS

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—because they have more balls than other bearings of equal size, and because the races are ground to give a large spot of contact between ball and race.

This is why Gurney Bearings are used in high-grade automobiles, trucks and tractors, in electric railway car axles, and in heavy duty machinery of all kinds.

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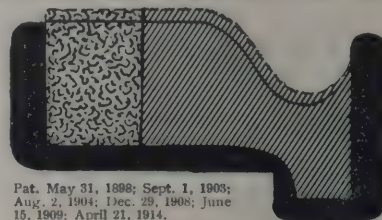
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Wheel Condition No. 6

When only the outer part of tread needs grinding this arrangement of abrasive and non - abrasive material in the Wheel Truing

Brake Shoe will correct matters—and without the car losing a minute's service.



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are truly frictionless. The roller instead of turning on a pin rolls freely like a rolling pin.

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AMERICAN CARBON AND GRAPHITE MOTOR AND GENERATOR BRUSHES are selected according to operating conditions. We know brush material—you know your machine. Our combined knowledge will solve your brush problems.

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VAN DORN COUPLERS

are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

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2325 So. Paulina St., Chicago, Ill.



Use them in your terminals—
**PEREY TURNSTILES
or PASSIMETERS**

Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City

RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings; also
ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

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Write for
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The "Nycap=Exide" Battery
for
STORAGE BATTERY STREET CARS
THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

A Bill to Tax Education, Information, Business Progress and National Unity

Whatever it may be called the above is the title that should be given the bill passed by the last Congress for the ostensible purpose of "adjusting" the second-class postage rate, the postal rate on periodical literature.

A Plausible Argument

The fundamental argument (and a very plausible one) made by the friends of this act is that the present second-class rate acts as a "subsidy" to the publishers of *nationally* circulated periodicals.

Local circulations having the second-class rate are but lightly touched by the act. It is only circulations having statewide or *national* influence and value that must bear the great burden.

The "subsidy" (?) argument runs like this:

the present second-class rate is one cent a pound; to carry nationally distributed second-class mail costs the Government more than one cent a pound; the difference is a profit pocketed by publishers and therefore a "subsidy" from the Government to publishers; by making the rate substantially $3\frac{1}{2}$ cents a pound the difference of $2\frac{1}{2}$ cents a pound will come into the Government's coffers instead of forming a "subsidy" to line the pockets of publishers.

Now if there is anything whatsoever of logic in that argument it must mean that every publisher of a nationally circulated periodical is making a profit of $2\frac{1}{2}$ cents a pound on all matter he mails over and above the normal profit which any business should make.

The "Subsidy" Analyzed

There can be no escape from this conclusion. If the Government is sustaining a loss on nationally distributed second-class mail of roundly $2\frac{1}{2}$ cents a pound and if that $2\frac{1}{2}$ cents a pound forms a "subsidy" (a profit to publishers equal to the Government loss), then publishers must be making a profit of $2\frac{1}{2}$ cents a pound as a result of the one-cent rate, and this must be in addition to any other profits in the business from any other source.

This is what the framers of the bill say.

Let's see what the facts say.

A nationally known firm of certified public accountants made an audit, covering the year 1916, of the business of 86 representative periodicals of national circulation. This audit was presented before Congress during the discussion of the bill.

This audit shows that in 1916 these 86 publications sent under second-class mail One Hundred and Twenty-Four Million Three Hundred and Forty-Six Thousand Five Hundred and Ninety-Nine Pounds. For this they paid the Government at one cent a pound One Million Two Hundred Forty-Three Thousand Four Hundred Sixty-Five Dollars and Ninety-Nine Cents.

Now, if the "subsidy" argument is correct these 86 publications must have made in 1916 a profit of $2\frac{1}{2}$ cents a pound on the quantity mailed or a net profit, *due to the subsidy*, of Three Million One Hundred Eight Thousand Six Hundred Sixty-four Dollars and Ninety-seven Cents.

That sum would be the profit from the second-class subsidy alone without considering any profit which may have been made from any other source of revenue.

That's all perfectly clear. There can't be any mistake so far if the "subsidy" idea is valid.

But the audit also shows that the total net profits of these 86 publications from all sources amounted to only One Million One Hundred Ninety-seven Thousand Four Hundred and Three Dollars and Seventy-three Cents.

Total Profits a Fraction of the Mythical "Subsidy"

To put it another way. These publications made an average net profit each of roundly Fourteen Thousand Dollars after having each paid a postage bill averaging about Fourteen Thousand Five Hundred Dollars.

Yet according to the "subsidy" argument these publications were presented by the Government with a "subsidy" insuring them an average net profit of about Thirty-Six Thousand Dollars each.

In view of these authentic facts and figures, certified by the highest authority, is it not about time that this senseless talk about "publishers' subsidy" was abandoned and this matter considered on a sane, sensible business basis?

The publishers of national periodicals are making no attempt to escape war taxation. Far from it. We are paying everything in the way of taxation that is levied upon any other line of business. We are cheerfully paying taxes on profits, on incomes, on telephone and telegraph tolls, and every other tax that is general to all forms of business.

Take the Publishers' Profits

Furthermore, we have petitioned Congress that if necessary for the support of the Government, taxation shall be levied by which the Government will take *all* the profits of the publishing business.

We do protest most vigorously against *this* tax which is made on the empty premise that it is to take away from the publishing industry a "subsidy" when there is no "subsidy."

We protest against it because it is a sham and a pretense. We protest against it because it falls entirely upon some publishers and not upon all.

We protest because as an addition to the enormous increase in the cost of paper it will prove confiscatory and will put many publishers out of business.

We protest because it is an enormous and inequitable tax on national literature, the most reliable source of national information and the greatest instrument for welding national unity of opinion and thought.

Bill Will Not Increase Government Revenue

We protest because by forcing many publishers out of business it will *not* increase Government revenues and will stultify and cripple the great service rendered by national publications. Not alone those of a literary character, but also those which are powerful adjuncts to the progress of production in agriculture, manufacture, science and in material development of every kind.

We believe that most farseeing American business men will sense the dangers in this bill. And we ask that those who do see it will immediately communicate with Congressmen and Senators urging the repeal of this dangerous legislation, and that if it be desirable as a war measure to lay a special tax on the publishing industry that it shall be made on a just business basis, which will not cripple the ability of this industry to continue its great service to the public and to commerce in all its branches.

Will you do it?

McGraw-Hill Co., Inc., New York

Publishers of { Power Coal Age
Electrical World
American Machinist

The Contractor
Electrical Merchandising
Engineering News-Record

Electric Railway Journal
Engineering and Mining Journal
Metallurgical and Chemical Engineering



Le Carbone
Carbon Brushes are
uniform. They talk
for themselves.

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You get more than simply
BRAKE SHOES when you use
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You get the advantage of our
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Miles of service from the
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All of which means increased
efficiency and decreased cost of
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Longwear Bushings

Made of Hardened Steel.

Accurate and Uniform.

Do not forget our "Longwear" Brake Pins

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Horne Double Acting Brakes
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Compressors

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resters
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Samson Bell and Register Cord

Solid braided cotton, extra quality. All sizes and colors.
More durable, more economical and better looking than
leather or rawhide. Send for samples and full information.

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SMITH-WARD BRAKE COMPANY, Inc.

17 Battery Place, New York

JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
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BEACH OIL ELECTRIC CAR

A self-propelled car of the latest type, embodying new and
practical features.

Our engineers can help you turn branch line losses into profits.

ELECTRIC CAR & LOCOMOTIVE CORPORATION

Ralph H. Beach, Pres.

165 Broadway, New York, N. Y.



Art Work and Engraving

Collier Service *Secures Patrons for Car Advertising*

If you read car advertisements—and who doesn't?—you must have noticed the number of representative national advertisers.

The purchasers of this advertising service did not beg for admission to the street car racks. They had to be *shown* that street car advertising is profitable.

They were not interested in the car card space alone—they were interested in the message Collier Service could put there.

A visit to the art department of Collier Service just to watch an artist produce an effective card is an eye-opener showing how this organization makes car card advertising an asset for its customers, and therefore an assured income to the Railway Company.

Barron G. Collier
INCORPORATED

Candler Building

220 West 42nd Street, New York City

SEARCHLIGHT SECTION

Railway Motors

Ten Westinghouse No. 306 Railway Motors, Type CA.

Eight Westinghouse No. 317-A-2 Railway Motors with gears and pinions, ratio 21:68, 6-in. axle bearings, complete with double-end ALF control.

Four Westinghouse No. 317-A with gears and pinions, ratio 21:68, 6-in. axle bearings.

Rotary Converters

Three 300-kw. General Electric Type TC Rotary Converters, 3 phase, 60 cycle, 6 pole, 600/1200 volts d.c., 379 volts a.c., 1200 r.p.m.

Three 300-kw. General Electric 3-phase Transformers, oil cooled, 12,000/24,000 volts primary, 370 volts secondary, with four 2½ per cent reduced-capacity taps in primary and 50 per cent starting tap in secondary.

Complete switchboard equipment.

We have on hand all classes of Power Machinery

MACGOVERN & COMPANY, Inc.

114 Liberty Street, New York City

IMMEDIATE SHIPMENT

TURBINES

- 1—500 KW. Westinghouse horizontal turbo unit, 3 ph., 60 cy., 560 V., 3600 rpm.
- 1—500 KW. General Electric Curtis steam turbine, 3 ph., 60 cy., 1800 rpm., 2300 volts, 150 lb. steam pressure, vertical type.
- 1—500 KW. Westinghouse Horizontal Turbo Generating Unit wound for 3 phase, 60 cy., 2300 volts, speed 3600 rpm., condensing duty.

DIRECT CONNECTED ALTERNATING UNIT

- 1—800 KW. Allis-Chalmers, 2300 v., 3 ph., 60 cy., 90 rpm. generator, direct connected to 22 and 44 x 48" Reynolds Corlies engine.

60 CYCLE ROTARY CONVERTERS

- 1—300 KW. West. rotary converter, 3 ph., 60 cy., 370 v., A.C., 575 v., D.C., 600 rpm., with 3—185 KVA. Gen. Elec., 60 cy. transformers, 2200-370 volts.
- 1—200 KW. Westg. 3 ph., 60 cy., 720 rpm., Rotary Converter, 575 volts D.C., 360/370 volts A.C.
- 1—150 KW. West. 3 ph., 60 cy. rotary converter, 550 v., 720 rpm., with two Scott connected transformers.

ARCHER & BALDWIN, Inc.

114-118 Liberty Street, New York City Telephone 4337-4338 Rector

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Wasson Air-Retrieving Trolley Bases. (U. S.)
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Anti-Friction Side Bearings.
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Anderson Brake Slack Adjusters.
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Chicago District Representatives for:

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FOR SALE

Waycross Street Railway

Are dismantling and offer for sale:

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CIVIL engineer, draftsman; good field man; age 40; 25 years' experience in building construction, municipal and electric street railway engineering; best references. PW-32, Elec. Ry. Journal, Philadelphia.

EFFICIENT electric railway maintenance man of long, practical experience in charge of inspection, repairs and overhauling of cars; 35 years old; married; now employed; desires a change. PW-14, Elec. Ry. Journal, San Francisco.

FREIGHT traffic man; twenty years steam and electric road freight experience; will inaugurate and operate freight on electric line; at present employed; A-1 references. PW-18, Electric Railway Journal.

GENERAL superintendent wants position. Have a successful record in operation and maintenance with present and past employers. PW-22, Elec. Ry. Journal, Philadelphia.

MANAGER, or general superintendent. Position as manager or general superintendent of city or interurban electric railway. Twelve years' executive and operating experience in all departments. Full particulars upon request. PW-15, Elec. Ry. Journal, Chicago.

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SUPERINTENDENT desires change. Now employed in direct charge of transportation and roadways. Eight years' experience. Age 31, married. Best of references. Can successfully deal with union men. PW-23, Elec. Ry. Journal, Philadelphia.

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AS-21, Electric Railway Journal, 1570 Old Colony Bldg., Chicago, Ill.

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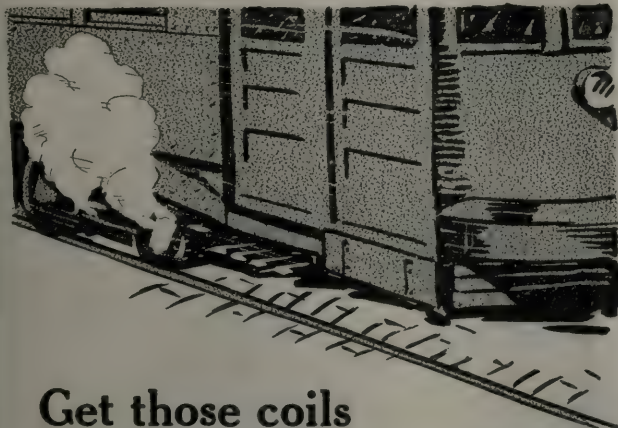
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Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.

Fuses, Refillable.

Columbia M. W. & M. I. Co.
General Electric Co.
Horne Mfg. Co.

Gages, Oil and Water.

Ohio Brass Co.

Gaskets.

Diamond State Fibre Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas-Electric Cars.

General Electric Co.

Gas Producers.

Westinghouse Elec. & M. Co.

Gates, Car.

Brill Co., The J. G.

Gear Blanks.

Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Wks. Co.

Gear Cases.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Ry. Appliance Co.
Westinghouse Elec. & M. Co.

Gears and Pinions.

Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Long Co., E. G.
National Ry. Appliance Co.
Nuttall Co., R. D.

Generating Sets, Gas-Electric.

General Electric Co.

Generators.

Dick, Kerr & Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)

Graphite.

Dixon Crucible Co., Joseph.
Morgan Crucible Co.

Grates, Chain.

Green Eng'g Co.

Greases. (See Lubricants.)

Grinders and Grinding Supplies.

Goldschmidt Thermit Co.
Indianapolis Switch & Frog Co.
Railway Track-work Co.

Grinding Blocks & Wheels.

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Guards, Trolley.

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Harps, Trolley.

Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Star Brass Works.
Western Electric Co.

Headlights.

Crouse-Hinds Co.
Electric Service Supplies Co.
General Electric Co.
Long Co., E. G.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Headlinings.

Pantatote Co., The.

Heaters, Car, Electric.

Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water.

Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car, Stove.

Electric Service Supplies Co.
Smith Heater Co., Peter.

Holsts and Lifts.

Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.
Yale & Towne Mfg. Co.

Hose Bridges.

Ohio Brass Co.

Hose, Pneumatic and Fire.

Johns-Manville Co., H. W.

Hydraulic Machinery.

Niles-Bement-Pond Co.
Watson-Stillman Co.

Hydrogrounds.

Horne Mfg. Co.

Inspection.

Elec'l Testing Laboratories.
Hunt & Co., Robert W.

Instruments, Measuring, Testing and Recording.

Economy Electric Devices Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & M. Co.
Weston Elec'l Instrument Co.

Insulating Cloths, Paper and Tape.

Anchor Webbing Co.
Diamond State Fibre Co.
General Electric Co.
Hope Webbing Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Okonite Co.
Packard Electric Co.
Standard Paint Co.
Standard Underground Cable Co.
Standard Woven Fabric Co.
United States Rubber Co.
Westinghouse Elec. & M. Co.

Insulation. (See also Paints.)

Anderson M. Co., A. & J. M.
Diamond State Fibre Co.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Mitchell-Rand Mfg. Co.
Okonite Co.
United States Rubber Co.
Westinghouse Elec. & M. Co.

Insulators. (See also Line Material.)

Anderson M. Co., A. & J. M.
Creaghead Engrg. Co.
Drew Elec. & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Macallen Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
White Elec. Supply Co., T. C.

Insulator Pins.

Electric Service Supplies Co.
Hubbard & Co.

Insurance, Fire.

Marsh & McLennan.

Inventions, Developed and Perfected.

Peters & Co., G. D.

Jacks. (See also Cranes, Hoists and Lifts.)

Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Duff Manufacturing Co.
National Ry. Appliance Co.
Watson-Stillman Co.

Joints, Rail.

Atlantic Welding Co.
Carnegie Steel Co.
Rail Joint Co.
Zelnicker Supply Co., W. A.

Journal Boxes.

Bemis Car Truck Co.
Brill Co., The J. G.
Gurney Ball Bearing Co.
Long Co., E. G.
Railway Roller Bearing Co.

Junction Boxes.

Johns-Manville Co., H. W.
Standard Underground Cable Co.

Laboratories.

Elec'l Testing Laboratories.
Little, Inc., Arthur D.

Lamp Guards and Fixtures.

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Arc and Incandescent.

Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & M. Co.

Lamps, Signal and Marker.

Ohio Brass Co.

Lathes, Car Wheel.

Niles-Bement-Pond Co.

Lighting Regulators, Car.

Holden & White, Inc.

Lightning Arresters.

Horne Mfg. Co.

Lightning Protection.

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)

Anderson M. Co., A. & J. M.
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Columbia M. W. & M. I. Co.
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Diamond State Fibre Co.
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Johns-Manville Co., H. W.
Macallen Co.
More-Jones Brass & M. Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
White Elec. Supply Co., T. C.

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Baldwin Locomotive Works.
Brill Co., The J. G.
General Electric Co.
Westinghouse Elec. & M. Co.

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Lubricants, Oil and Grease.

Borne, Strymser Co.
Dearborn Chemical Co.
Dixon Crucible Co., Jos.
Galena-Signal Oil Co.

Lumber. (See Poles, Ties, Posts, etc.)

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Columbia M. W. & M. I. Co.
Holden & White, Inc.
Horne Mfg. Co.

Machine Tools.

Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.
Watson-Stillman Co.

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Long Co., E. G.
National Ry. Appliance Co.
Roller Lock Nut Co.

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Overhead Equipment. (See Line Material.)

Oxy-Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)

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Power Specialty Co.
United States Rubber Co.

Packing Rings.

Johns-Manville Co., H. W.

Paints and Varnishes. (Insulating.)

Holden & White, Inc.
Johns-Manville Co., H. W.
Long Co., E. G.
Mica Insulator Co.
Mitchell-Rand Mfg. Co.
Packard Electric Co.
Standard Paint Co.

Paints and Varnishes. (Preservative.)

Dixon Crucible Co., Jos.
Johns-Manville Co., H. W.
Long Co., E. G.
National Ry. Appliance Co.
Standard Paint Co.

Paints and Varnishes for Woodwork.

National Railway Appliance Co.

Paving Material.

American B. S. & Fdy. Co.

Pickups. (Trolley Wire.)

Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., C. N.

Pinions. (See Gears.)

Pins, Case Hardened, Wood and Iron.

Bemis Car Truck Co.
Electric Service Supplies Co.
Long Co., E. G.
Ohio Brass Co.

Pipe.

National Tube Co.

Pipe Fittings.

Power Specialty Co.
Standard Steel Works Co.
Watson-Stillman Co.

Pliers, Insulated.

Rubber Ins. Metals Corp.

Pole Sleeves.

Drew Electric & Mfg. Co.

Poles, Metal Street.

Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Hubbard & Co.
National Railway Appliance Co.

Poles, Ties, Posts, Piling and Lumber.

Carney & Co., B. J.
Lindsay Bros. Co.
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Valentine-Clark Co.

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Northern White Cedar Ass'n.
Page & Hill Co.
Valentine-Clark Co.

Poles, Trolley.

Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Long Co., E. G.
National Tube Co.
Nuttall Co., R. D.

Pole Reinforcing.

Hubbard & Co.

Poles, Tubular Steel.

National Tube Co.

Potholes.

Okonite Co.

Power Saving Devices.

Arthur Power-Saving Recorder Co.

Pressure Regulators.

General Electric Co.
Ohio Brass Co.

Pumps.

Watson-Stillman Co.

Punches, Ticket.

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Bonney-Vehslage Tool Co.
Horne Mfg. Co.
International Register Co., The.
Wood Co., C. N.
Woodman Mfg. & Supply Co., R.

Punching Machinery.

Watson-Stillman Co.

Purifiers, Feed Water.

Scalfe & Sons Co., Wm. B.

Rail Grinders. (See Grinders.)

Rails, Relaying.

Zeinicker Supply Co., W. A.

Rail Welding. (See Welding Processes and Apparatus.)

Rattan.

Brill Co., The J. G.
Electric Service Supplies Co.

Hale & Kilburn Co.
St. Louis Car Co.

Recorders, Power Saving.

Arthur Power-Saving Recorder Co.

Registers and Fittings.

Bonham Recorder Co.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The.
Long Co., E. G.
Ohmer Fare Register Co.
Rooke Automatic Register Co.

Reinforcing Concrete.

American Steel & Wire Co.

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(See also Coil Banding and Winding Machines.)
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Repair Work. (See also Coils, Armature and Field.)

Cleveland Armature Works.
Coil Mfg. & Repair Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Independent Lamp & W. Co.
Westinghouse Elec. & M. Co.

Replacers, Car.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Resistance, Grid.

Columbia M. W. & M. I. Co.

Resistance, Wire and Tube.

General Electric Co.
Westinghouse Elec. & M. Co.

Retrievers, Trolley. (See Catchers and Retrievers, Trolley.)

Rheostats.
General Electric Co.
Mica Insulator Co.
Westinghouse Elec. & M. Co.

Roofing, Building.

Johns-Manville Co., H. W.
Standard Paint Co.

Roofing, Car.

Johns-Manville Co., H. W.
Pantasote Co., The.

Rubber Specialties of all Kinds.

United States Rubber Co.

Sand Blasts.

National Ry. Appliance Co.

Sanders, Track.

Brill Co., The J. G.
Cleveland Fare Box Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Holden & White, Inc.
Horne Mfg. Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car.

Brill Co., The J. G.

Sash, Metal, Car Windows.

Hale & Kilburn Co.

Scales, Weights, Balances and Dynamometers.

Horne Mfg. Co.

Seating Material. (See also Rattan.)

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Du Pont Fabrikoid Co.
Pantasote Co., The.

Seats, Car.

Brill Co., The J. G.
Hale & Kilburn Co.
Peters & Co., G. D.
St. Louis Car Co.

Second-Hand Equipment.

(See also pages 88, 89.)
Archer & Baldwin.
MacGovern & Co.

Shade Rollers.

Hartshorn Co., Stewart.

Shades, Vestibule.

Brill Co., The J. G.
Electric Service Supplies Co.

Shovels.

Hubbard & Co.

Signals, Car Starting.

Consolidated Car Heating Co.
National Pneumatic Co.

Signals, Highway Crossing.

U. S. Electric Signal Co.

Signal Systems, Block.

Electric Service Supplies Co.
Federal Signal Co.

Union Switch & Signal Co.
U. S. Electric Signal Co.
Wood Co., C. N.

Slack Adjusters. (See Brake Adjusters.)

Sleet Wheels and Cutters.

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Holden & White, Inc.
More-Jones Brass & M. Co.
Nuttall Co., R. D.

Snow-Plows, Removers, Sweepers, etc.

Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.

Soldering and Brazing Apparatus. (See Welding Proc. & App.)

Speed Indicators.
Johns-Manville Co., H. W.
Wood Co., C. N.
Woodman Mfg. & Supply Co., R.

Spikes.

American Steel & Wire Co.

Splicing Compounds.

Johns-Manville Co., H. W.
Standard Woven Fabric Co.
United States Rubber Co.
Westinghouse Elec. & M. Co.

Splicing Sleeves. (See Clamps and Connectors.)

Springs, Car & Truck.

American Steel Foundries.
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
Standard Steel Works Co.
Taylor Elec. Truck Co.
Union Spring & Mfg. Co.

Sprinklers, Track and Road.

Brill Co., the J. G.
St. Louis Car Co.

Step's, Car.

American Mason S. T. Co.
Universal Safety Tread Co.

Stokers, Mechanical.

Babcock & Wilcox Co.
Green Engrg. Co.
Murphy Iron Works.
Westinghouse Elec. & M. Co.

Storage Batteries. (See Batteries, Storage.)

Straps, Car, Sanitary.
Holden & White, Inc.
Railway Improvement Co.

Structural Iron. (See also Bridges.)

Superheaters.

Babcock & Wilcox.
Power Specialty Co.

Sweepers, Snow. (See Snow-Plows, Sweepers and Brooms.)

Switchstands.

Indianapolis Switch & Frog Co.
Kilby Frog & Switch Co.
Ramapo Iron Works.

Switches, Track. (See Track, Special Work.)

Switches and Switchboards.

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Tampers, Tie.

Ingersoll-Rand Co.

Tapes & Cloth. (See Insulating Cloths, Paper and Tape.)

Telephones and Parts.
Electric Service Supplies Co.

Terminals.

Frankel Connector Co.

Terminal Cables.

Standard Underground Cable Co.

Testing Clips.

Frankel Connector Co.

Testing, Commercial and Electrical.

Electrical Testing Laboratories.
Hunt & Co., Robert W.

Testing Instruments. (See Instruments, Electrical, Measuring, Testing.)

Thermostats.

Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter.

Ticket Boxes.

Macdonald Ticket & Ticket Box Co.

Ticket Choppers and Destroyers.

Electric Service Supplies Co.
Patten Co., Paul B.

Tickets and Transfers.

American Railway Supply Co.

Ties, Mechanical.

Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel.

Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood. (See Poles, Ties, etc.)

Tools, Track and Miscellaneous.

American Steel & Wire Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Johns-Manville Co., H. W.
Klein & Sons, M.
Railway Track-work Co.

Torches, Acetylene. (See Cutting Apparatus, Oxy-Acetylene.)

Towers and Transmission Structures.

Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse Elec. & M. Co.

Tower Wagons and Auto-Trucks.

McCardell & Co., J. R.

Track, Special Work.

American Frog & Switch Co.
Barbour-Stockwell Co.
Cleveland Frog & Crossing Co.
Columbia M. W. & M. I. Co.
Indianapolis Switch & Frog Co.
Kilby Frog & Switch Co.
New York Switch & Crossing Co.
Ramapo Iron Works.

Transfers. (See Tickets.)

Transfer Issuing Machines.

Ohmer Fare Register Co.

Transfer Tables.

Archbold-Brady Co.

Transformers.

General Electric Co.
Packard Electric Co.
Westinghouse Elec. & M. Co.

Treads, Safety Stair Car Step.

American Mason Safety Tread Co.
Universal Safety Tread Co.

Trolley Bases.

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Holden & White, Inc.
Horne Mfg. Co.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Ohio Brass Co.
Trolley Supply Co.

Trolley Bases, Retrieving.

Holden & White, Inc.

Trolley Shoes.

Holden & White, Inc.
Miller Trolley Shoe Co.

Trolleys and Trolley Systems.

Ford Chain Block & Mfg. Co.

Trucks, Car.

American Steel Foundries.
Baldwin Locomotive Works.
Bemis Car Truck Co.
Brill Co., The J. G.
Long Co., E. G.
St. Louis Car Co.
Taylor Elec. Truck Co.

Tubing, Steel.

National Tube Co.

Turbines, Steam.

General Electric Co.
Westinghouse Elec. & M. Co.

Turnstiles.

Perey Mfg. Co., Inc.

Valves.

Ohio Brass Co.

Varnishes. (See Paints, etc.)

Ventilators, Car.

Brill Co., The J. G.
Holden & White, Inc.
Railway Utility Co.
St. Louis Car Co.

Volt Meters. (See Instruments.)

Washers.

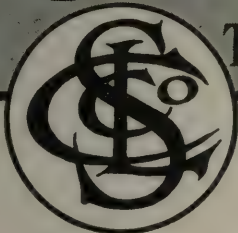
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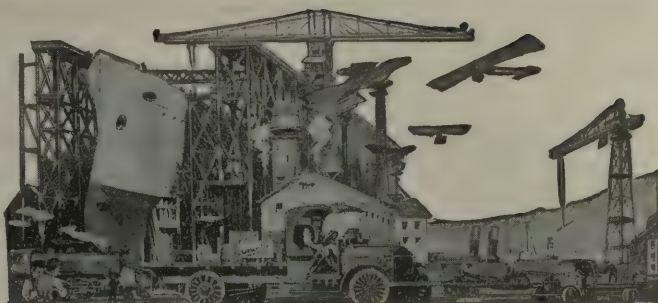
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Wheel Guards. (See Fenders and Wheel Guards.)**Wheels, Car, Cast Iron.**

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Association of Mfrs. of Chilled Car Wheels.

WHAT AND WHERE TO BUY

Bemis Car Truck Co.
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Wheels, Car. (Steel and Steel Tired.)

American Steel Foundries.
Bemis Car Truck Co.
Carnegie Steel Co.
Standard Steel Works Co.

Wheels, Trolley.

Anderson M. Co., A. & J. M.
Rayonet Trolley Harp Co.
Bound Brook Oil-less Bearing Co.

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Eureka Co.
General Electric Co.
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Long Co., E. G.
More-Jones Brass & M. Co.
Nuttall Co., R. D.
Star Brass Works.

Whistles, Air.

General Electric Co.
Ohio Brass Co.

Wire Rope.

American Steel & Wire Co.
Roebbling's Sons Co., John A.

Wires and Cables.

Aluminum Co. of America.
American Electrical Works.
American Steel & Wire Co.
Bridgeport Brass Co.
D & W Fuse Co.
General Electric Co.
Kerite Insulated Wire & Cable Co.
Okonite Co.
Packard Electric Co.
Page Steel & Wire Co.
Roebbling's Sons Co., John A.
Standard Underground Cable Co.
Westinghouse Elec. & M. Co.

Wood Preservatives.

Lindsley Bros. Co.
Republic Creosoting Co.
Valentine Clark Co.

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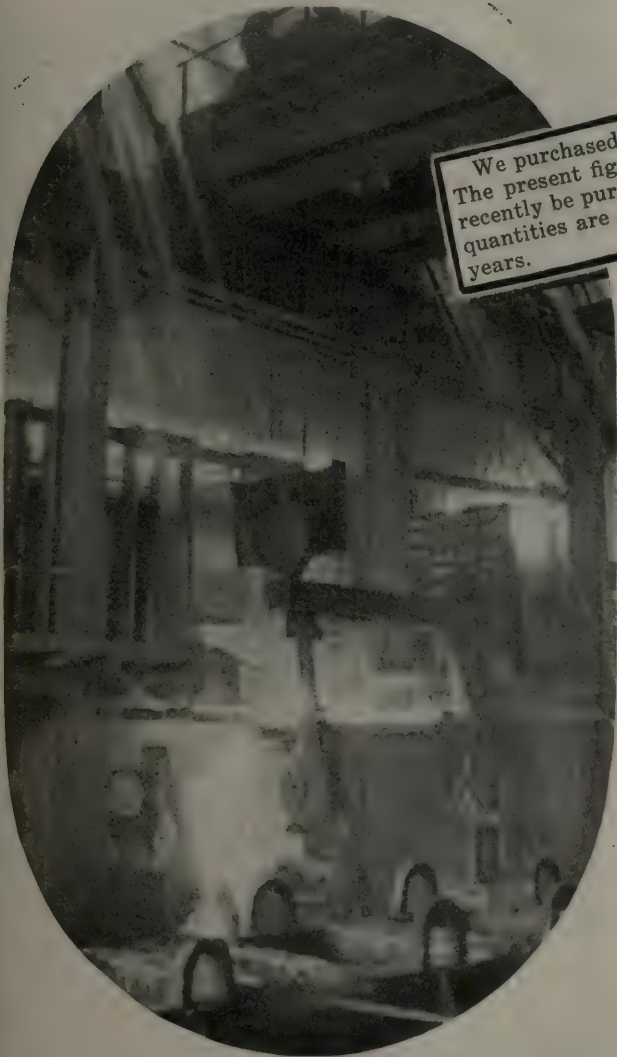
Just a reminder that Uncle Sam will gladly pay you \$5.00 for every \$4.13 saved this month.

Rails To-day

are

\$102.⁰⁰

We purchased steel rails less than two years ago at \$31.50. The present figure is \$102, and while small quantities could recently be purchased for comparatively short delivery, large quantities are quoted for delivery in eighteen months to two years.



To-Morrow

? ? ?

The above item was clipped from an article by a Purchasing Agent.

Today he may get steel rails for \$102. Tomorrow he may have to pay \$200—and consider himself lucky to get them at all!

How about specifying Titanium treatment for **your** new rails—it will ease your mind later on—when other people have to **renew** their rails at prohibitive prices, while your Titanium-treated rails stand the wear and tear so well that renewals are greatly reduced.

Ask us about this.

TITANIUM ALLOY MANUFACTURING COMPANY

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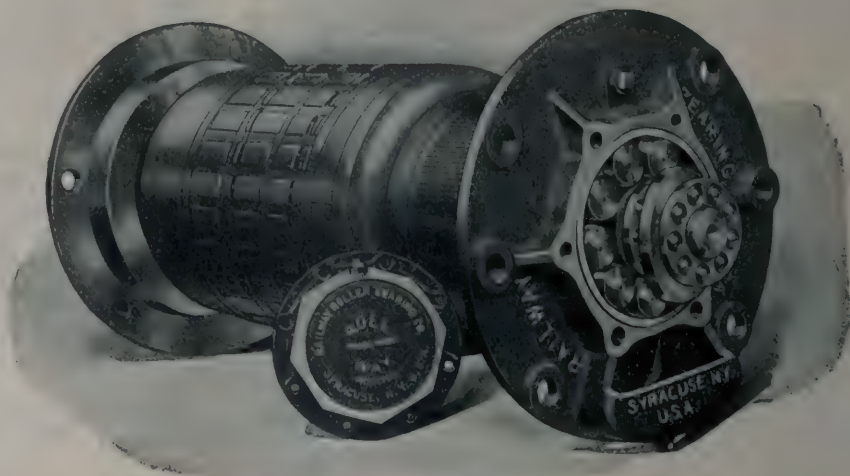
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Rollway Bearings

**Will Raise
Your
Schedule
Speeds**



Of course, you are interested in saving power because that means saving coal—and coal is pretty scarce and expensive in these days.

But that isn't the biggest return you can get for an investment in Rollway Bearings. Note the following figures:

A railway compared two 26-ton, four-motor cars, one with plain bearings and one with Rollway Bearings, over a 12.7 mile line with the same motorman and under the same physical conditions.

**The Rollway Bearing car not only
used 10.15 per cent less energy, but it
made the run in**

55 instead of 61 minutes

**This saving of 9 per cent in running time is
almost the equivalent of 9 cars for 10 for the
same car mileage!**

**The Railway Roller Bearing Co.
Syracuse, New York**



The General Manager's Belief

"Now that the Peter Witt front-entrance, center-exit, pay-as-you-pass car is standardized in construction and equipment, I believe that it will quickly come into general use on the big city systems. It is the one arrangement that eliminates passenger congestion in the car, and by so doing largely eliminates car congestion on the street."

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS



Another Record—

With 1200-Volt Equipment Oregon Electric Railway

The Oregon Electric Railway is equipped exclusively with General Electric apparatus, GE-205, GE-73 and GE-222 motors on the cars and GE-207 and 212 motors on the locomotives.

In all of the year 1916 this great

200-mile electrification had only three mechanical and seven electrical failures, and the average run between detentions was 331,945 miles covering high-speed passenger, locomotive freight and locomotive switching service.



General Electric Company.

General Office

Sales Offices

lant at Windsor (W.Va.), Which Furnishes Power to West Penn Rai

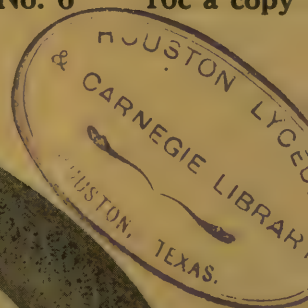
ELECTRIC RAILWAY JOURNAL

New York, February 9, 1918

McGraw-Hill Company, Inc.

Vol. 51, No. 6

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DURADUCT

CAR WIRING CONDUIT

Standard for Birney
One-Man Safety Car.

Eliminates useless weight and saves
in operating expense.

DURADUCT is easy to install, too!

TUBULAR WOVEN FABRIC COMPANY
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Northern Electric Company Distributors for Canada
LIMITED



Service: The Watchword of the Railways Transportation: The Duty of the Railways

ARE you doing your duty to both your country and your community by giving them freight as well as passenger transportation? How better can you do your duty than by doing your part in relieving the freight congestion?

The Electric Railways can accomplish wonders in collecting and distributing freight and greatly relieve the Steam Railroads. It is your duty to render this service, and bear in mind also that it will pay good returns, both financially and in the good-will of the public. Communities along your lines will naturally welcome the opportunity in these busy times to use the electric lines for freight service. They do not have to be told that the Steam Railroads are overburdened.

The Westinghouse Electric Company is ready to help you investigate your freight haulage problem. Call on our nearest District Office for information on Baldwin-Westinghouse locomotives—specially designed for electric railway freight haulage.

Address either company

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

Electric Railway Journal

H. W. BLAKE, *Editor*

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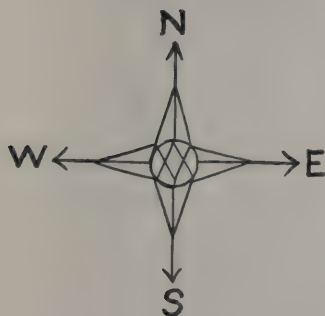
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Minn.

Westinghouse

Underfeed Stokers

—Burn a Great Variety of Fuels
Satisfactorily — Ranging from
High-Volatile Eastern to High-
Ash Western Coals and Lignite.

Wyo.



La.



Mass.

In the United States the Westinghouse Underfeed Stoker has been installed as far West as Wyoming, as far East as Massachusetts, as far North as Minnesota and as far South as Louisiana. Its operation on the wide variety of fuels found from the Rockies to the Atlantic Coast has been very satisfactory.

If you are a Westerner, we ask you to personally investigate our Western Plants. If a Northerner, Easterner or Southerner, we ask you to personally visit our plants in your territory.

We know it will be more satisfactory for you to get the facts first hand.

Write for a list of installations near you.



Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



Friction Tape

Cable Tape

Remarkably smooth, free from ravelings and easily handled. Double calendered and double spread, insuring against pin holes. The compound does not come off on the hands nor transfer from one layer to another. The tapes are free from sulphur and are non-corrosive. The grip or friction of all is exceedingly strong.

Westinghouse—Highest grade, very durable, long yardage. Used for generator and motor work. Unequaled for railway motor repairs. Used on all Westinghouse machines of over 200 volts.

IXL—High Yardage—Withstands grease and oils well and is recommended for general use. Used exclusively by a number of the largest street railway lines in the country.

XLO—Similar to the IXL, except that it is more heavily impregnated so that it is more suitable for severe outdoor service.

Adhere—A good tape at a very low price.

A perfect insulation. Acid, alkali, and waterproof, non-corrosive, always flexible. Affords both mechanical and dielectrical protection. Recommended particularly for high-voltage lines, in mines, in subways, and for submarine splicing. Seventy-five feet per roll (10 ounces).

Splicing Compound

Rubber Insulating Tapes of unquestionable superiority. The demand has steadily increased as the crucial test of time has demonstrated their permanent value. Thoroughly waterproof and perfect insulating mediums. Not injured by exposure to weather. Do not deteriorate.

Westinghouse Special—Highest grade. Used for severest conditions. Has as high dielectric strength as the insulation on the wire.

Pittsburgh—Medium grade for less severe conditions.

Westinghouse Electric & Manufacturing Company

Sales Offices in All
Large American Cities

East Pittsburgh
Pennsylvania



791

Westinghouse

Power and Flexibility



Electrically operated train on the Paoli division, P. R. R., equipped with Electro-Pneumatic Brake

The Electro-Pneumatic brake possesses the power and flexibility which insures safety of High-Speed train movement and short, smooth station stops.

Brake Building our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

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Mexico City
New York, N. Y.
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San Francisco
Seattle, Wash.
St. Louis, Mo.
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Phono-Electric

Is Used
here for
Service
Insurance

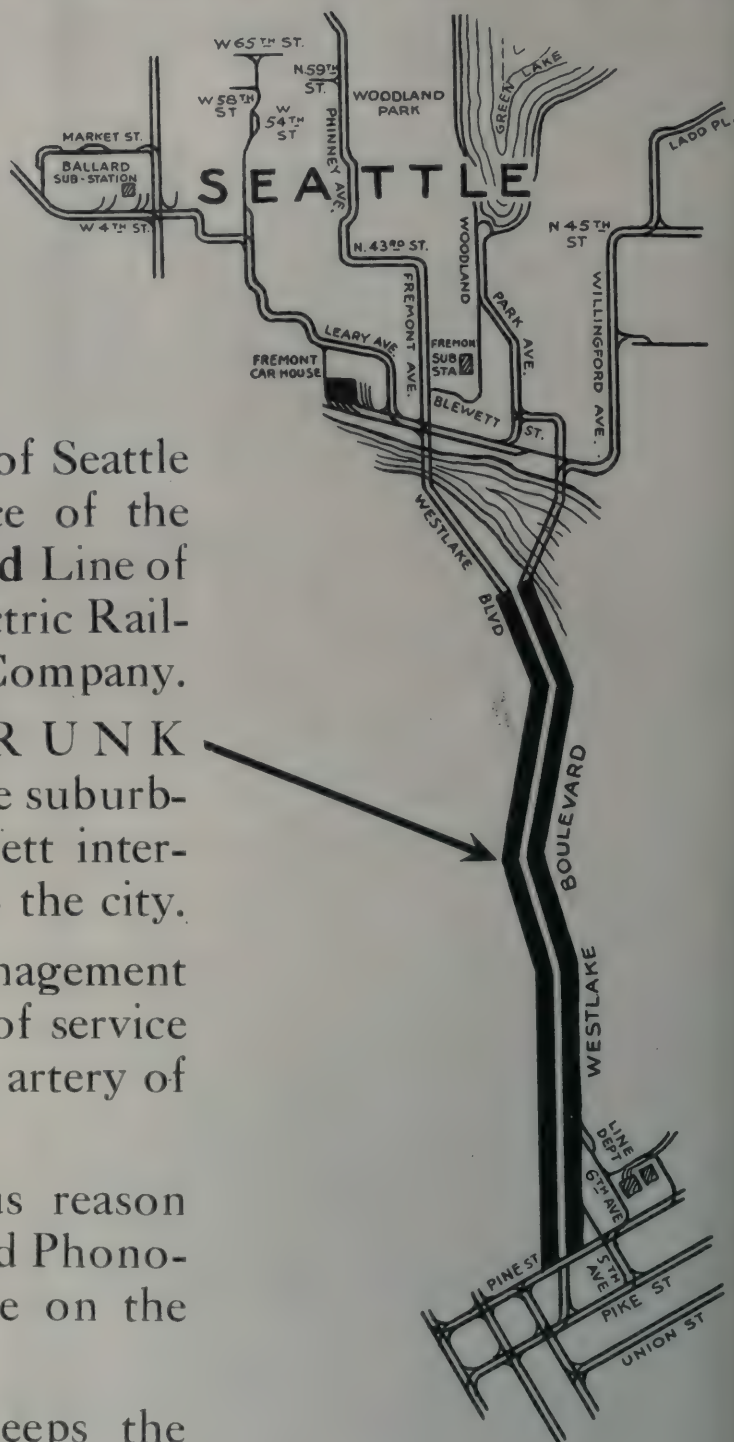
This map of a part of Seattle shows the importance of the **Westlake Boulevard** Line of the Puget Sound Electric Railway, Light & Power Company.

For it is the **TRUNK** over which **SIX** Seattle suburban lines and the Everett inter-urban line come into the city.

A progressive management doesn't take chances of service interruptions with an artery of that kind.

That's the obvious reason for using No.00 round Phono-Electric Trolley Wire on the curves of this line.

Phono - Electric keeps the tower wagon off the track.



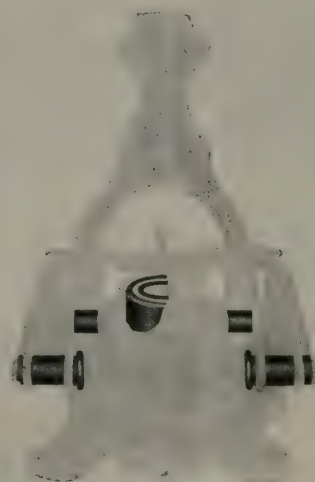
Bridgeport Brass Company
Bridgeport Connecticut



PRODUCTS



O-B Form I Trolley Base—Patented



Dark Portions Are Renewable Bushings

From the Railway Man's Standpoint

In operation and in construction O-B Trolley Bases reflect a familiarity with service conditions on the railway. They invariably meet with the approval of the Mechanical, Transportation and Line departments.

OPERATION

On rough track and smooth, on tangents and on curves the O-B Base holds the wheel to the wire. It swings freely and easily on a long sensitive bearing made up of caged rollers which cannot jam.

The springs can be adjusted to hold the wheel against the wire with a pressure which is right for your individual conditions. Then that pressure is maintained practically the same at all heights of the wire. Therefore, there is always sufficient pressure to keep the wheel on the wire without undue strain on base, car roof or line.

Current carrying capacity is in excess of even abnormal demands as actual tests have proved.

CONSTRUCTION

All the parts of the O-B Base which stand the brunt of the wear are fitted with steel bushings. These are easily and cheaply renewed when necessary. Thus at a slight cost many years are added to the life of the base.

Inspection and lubrication are easy. Remove one screw, slip out a retaining fork, lift the base from the main bearing and the vital parts are exposed. The main bearing is packed with heavy grease. The base works well with a minimum amount of attention.

O-B Bases are sturdy and rugged throughout. They give continuous and satisfactory service.

Send for an O-B Base for free trial on your own cars.

The Ohio Brass Company

New York

Philadelphia

Chicago

Los Angeles

San Francisco



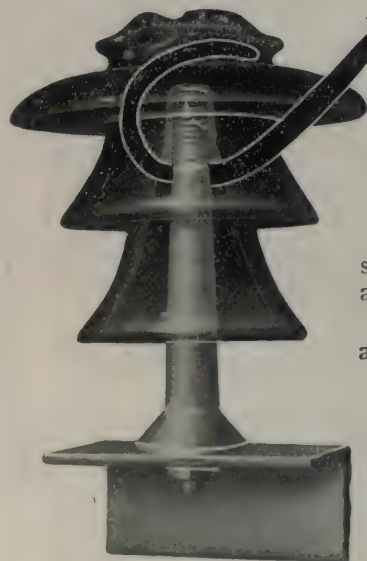
33,000 volt line on Bo-Arrow arms and Peirce Pins; 2200 volt primary on wood arms with Peirce clamp pins; 440 volt secondary on Peirce secondary racks. (Pittsburgh, Pa.)



One 33,000 volt line on Bo-Arrow arms and Peirce Forged Steel Pins. Two 33,000 volt lines on Steel Angle arms and Peirce pins. (Pittsburgh, Pa.)

Bo-Arrow Steel Cross Arms and Peirce Pins

carry the lines of the Duquesne Light Co. of Pittsburgh, Pa., through a district where atmospheric conditions are the worst possible for line equipment.



The threads of the thimble fit loosely over the threads of the pin, and a thin cork disc is provided between the top of the pin and the thimble. Under expansion the pin simply rides up further in the thimble, the cork disc compressing. None of the strain is communicated to the insulator.

Peirce pins are guaranteed to stand strains equal to their rated strength with a deflection of less than 10 degrees, and without danger to the insulator.

Our booklet tells about "Continuity—and How" to obtain it. Send for a copy.

The Hardware MAKES the Line—Hubbard makes THE Hardware

HUBBARD AND COMPANY
PITTSBURGH

Canadian Manufacturers and Distributors: Acme Stamping & Tool Works, Hamilton, Ontario

Wasted—

35% to 50% of TRACK MATERIAL

INTERNATIONAL STEEL TWIN TIES

Obviate this wasted material and labor

Of What Engineering Value is the Concrete or Ballast Between Wooden Ties? Absolutely None. It Represents an Economic Loss of Track Material and Labor

Steel Twin Ties are designed to overcome just that condition. The effective tie bearing area is placed at the top of the tie and parallel with the rail.

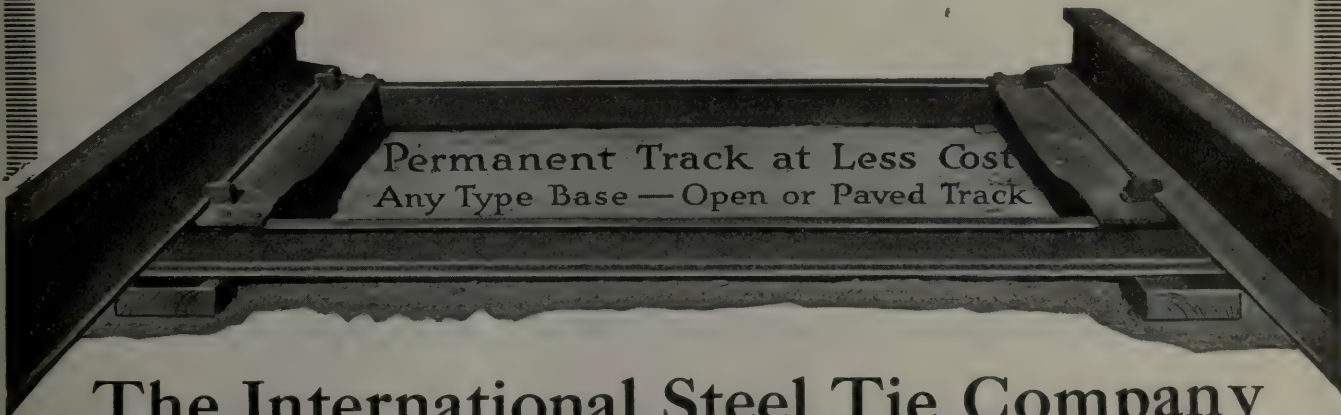
There is an engineering reason for every ounce of metal in a Steel Twin Tie. The 13 in. x 36 in. trussed plates carry the track loads and the 3 in. channels serve as anchorages and tie rods.

Seven inches of concrete beneath the tie plate puts just that much in effective bearing. An inch more than is usually used. And at the same time the excavation and concrete quantities below base of rail are reduced one-half.

Any way you look at them they are engineeringly right. The longer you delay your purchase of some of these ties the more money you waste in extraneous track materials and labor.

Ask our users if you want our best sales argument. If you are convinced ask us for a quotation and delivery.

Prompt deliveries made from stock



Permanent Track at Less Cost
Any Type Base — Open or Paved Track

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations
General Sales Office and Works: Cleveland, Ohio

REPRESENTATIVES:

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Los Angeles, Cal.

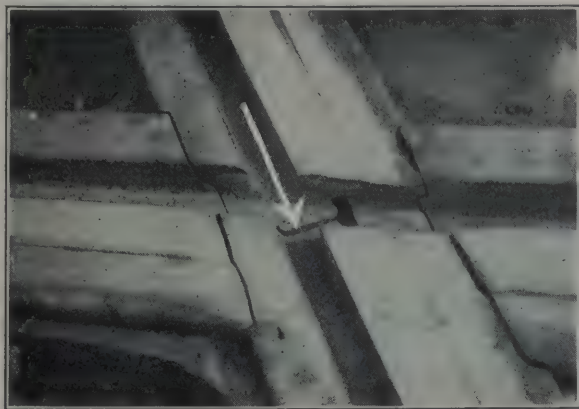
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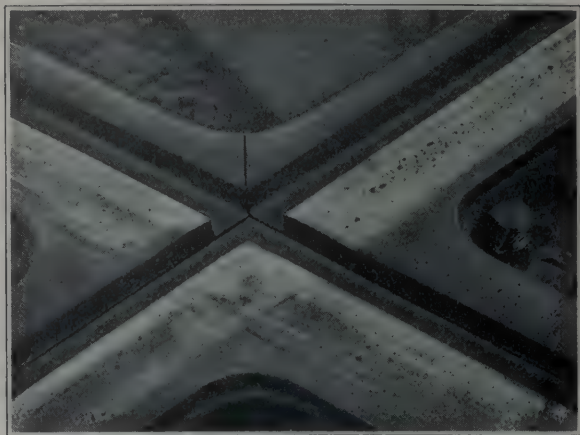
J. E. Lewis & Co.,
Dallas, Texas.

Maurice Joy,
Philadelphia.

William H. Ziegler,
Minneapolis, Minn.



What Happens to a Rolled Rail Crossing



How a Balkwill Articulated Cast Manganese Crossing Behaves

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of a rolled rail crossing are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill articulated cast-manganese crossing the difficulty is

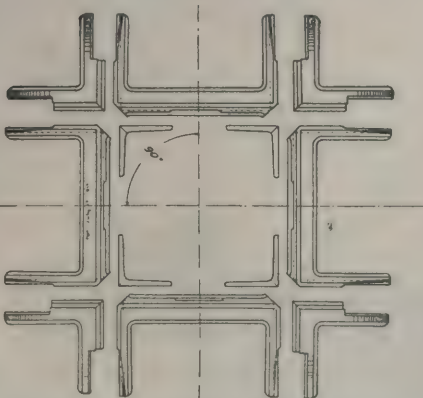
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings
Direct from Your Special Work Manufacturers**

The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio

Interurban Type
Stationary

***Bright, cheery, efficient
“Golden Glow” Light—
an excellent antidote for
this troublesome period
of conservation.***

Interurban Type
Portable

The various types of “Golden Glow” Headlights for interurban service all project powerful, penetrating, steady, non-blinding beams of “Golden Glow” light—a volume of light actually greater than the average arc headlight projects.

The types for city cars project this same powerful, non-blinding light without any greater current consumption than the old inefficient types of headlights.

The secret lies in the high efficiency of “Golden Glow” greenish glass reflectors and the general make-up of the headlight through and through.

Therefore when you adopt “Golden Glow” on your cars you are buying headlights scientifically correct in principle and design.

Place your order now, and soon your cars will be headed by beams of cheery “Golden Glow.”



City Type

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church Street

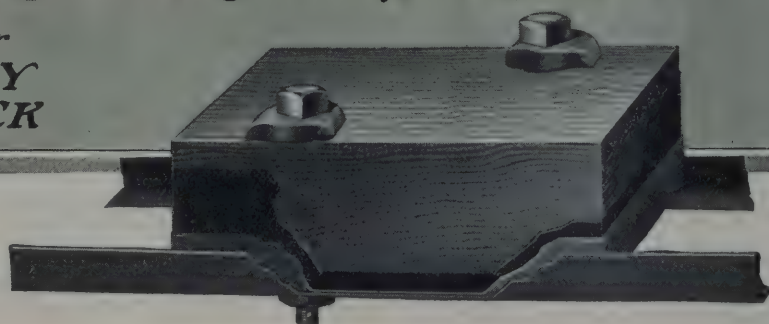
CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg

The MECHANICAL RAILWAY TIE

*For
CITY
TRACK*

*For
INTERURBAN
TRACK*



Substantial Construction Based on a Correct Mechanical Principle Is Your Guarantee that Me- chanical Ties Are Economical



The above photograph shows Mechanical Ties attached to rails. The track has been blocked up to the desired level and the pouring of concrete exactly as in ordinary paving is all that remains to be done. Could anything be simpler? Could any result be more substantial?

The principle on which the Mechanical Railway Tie is founded is not mere theory. Or perhaps it would be better to say the Mechanical Tie provides a means of putting a scientific theory into practice. At any rate, its practicability has been proven beyond argument.

It comprises all the desirable features of wood coupled with the strength and rigidity which only steel and concrete can impart. Yet it is so resilient that not a tremor of traffic is transmitted to the road-bed.

Mechanical Ties, installed, provide a permanent track foundation that means the utmost in economy—economy which is not confined to track maintenance alone but shows a decided influence on the maintenance of rails and equipment as well.

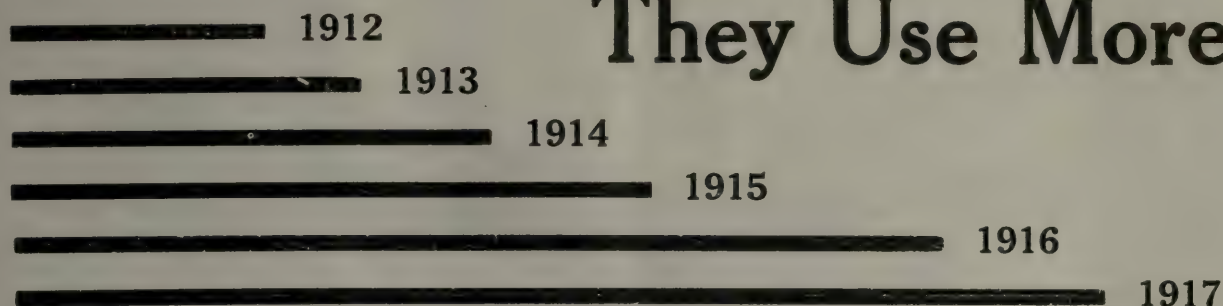
Install a half-mile of Mechanical Railway Ties for a test. Their showing will astonish you. Literature on request.

THE DAYTON MECHANICAL TIE CO.

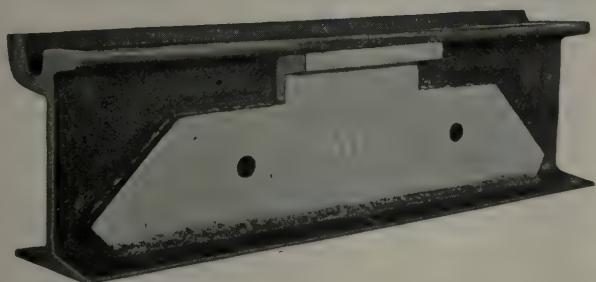
201 Third Street Arcade
DAYTON, OHIO

Provides the Desirable Qualities of Wood Plus the Strength of Steel, the Permanence of Concrete and the Resiliency of Asphalt—A NonConductor of Vibration

Every Year They Use More



Indianapolis Welded Joints Are Saving the Situation for Many Roads

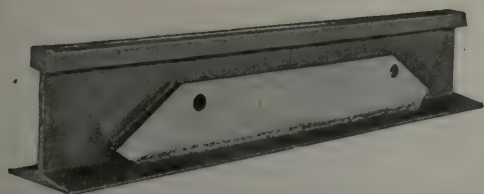


The "Apex" Joint
for Guard and Girder Rails

During the famine of supply and the prohibitive cost of new materials many roads can overcome the problem of manufacturing their tracks by the use of

The Indianapolis Method

Old track with worn-cupped rails, loose, leaky, pounding joints, can be made as good as new at less than 5% of the cost of relaying.



The "Simplex" Joint
for High Tee Rails

Reclamation
is
Conservation



January Sales of Electric Welder Department 4 times that of January 1917

Indianapolis Switch & Frog Company, Springfield, Ohio

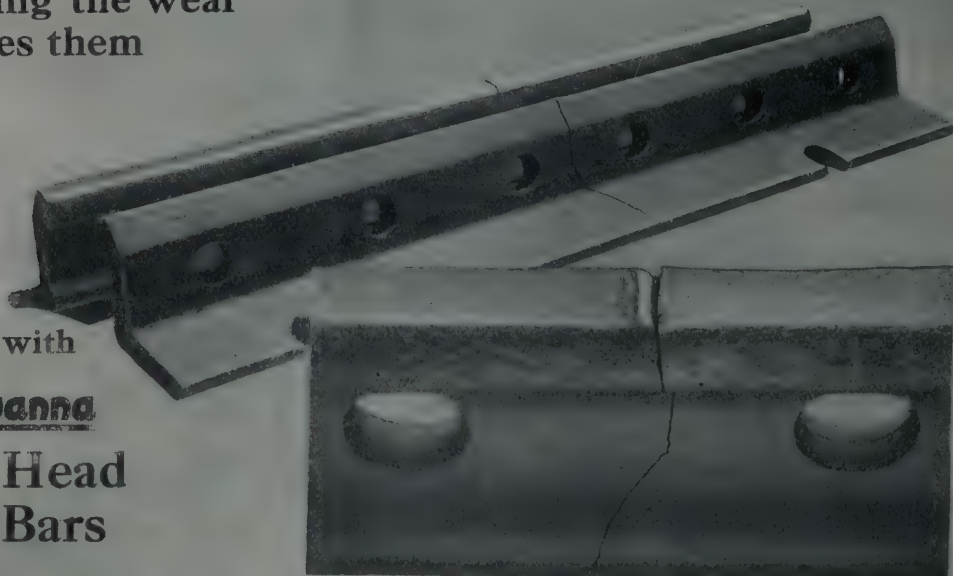
Stop your splice bar fractures

by avoiding the wear
that makes them
start!

You do this
by equipping with

Lackawanna

**Safety-Head
Angle Bars**



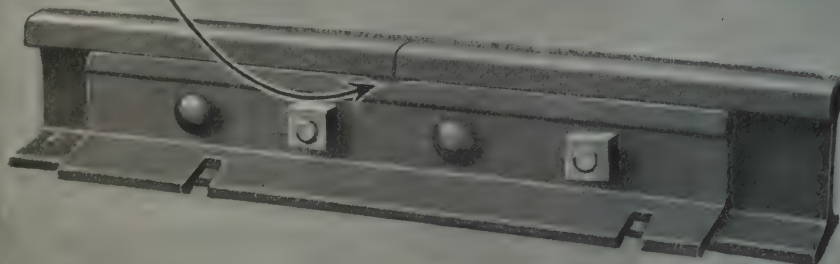
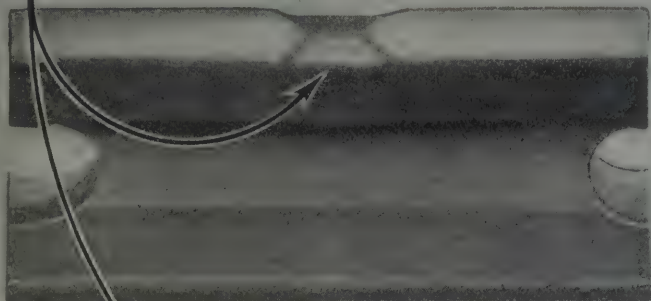
Angle bar fractures originate mainly in wear and cutting at the top, the break then apparently developing from the back action or upward thrust of the rail ends.

The Lackawanna Safety Head Angle Bar overcomes the liability to break by eliminating the initial causes. This is accomplished by depressing the metal in the head of the angle bar for a short space at the center where the rail ends meet, so that the bar will not be cut or worn by the action of the sharp undercorners of the rail heads at the ends. The metal in the angle bar therefore retains its original skin and finish without destruction or upsetting under the pounding of the wheels at the joints, and in this condition is able to resist the severe strain due to the upward thrust of the rail ends caused by the passing loads.

A trial of Safety Head Angle Bars where the ordinary kind have given most trouble will soon prove our construction capable of big savings and greater safety. Write for further information.

Ask for Our Booklet
"Improved Track Appliances"

291



Lackawanna Steel Company

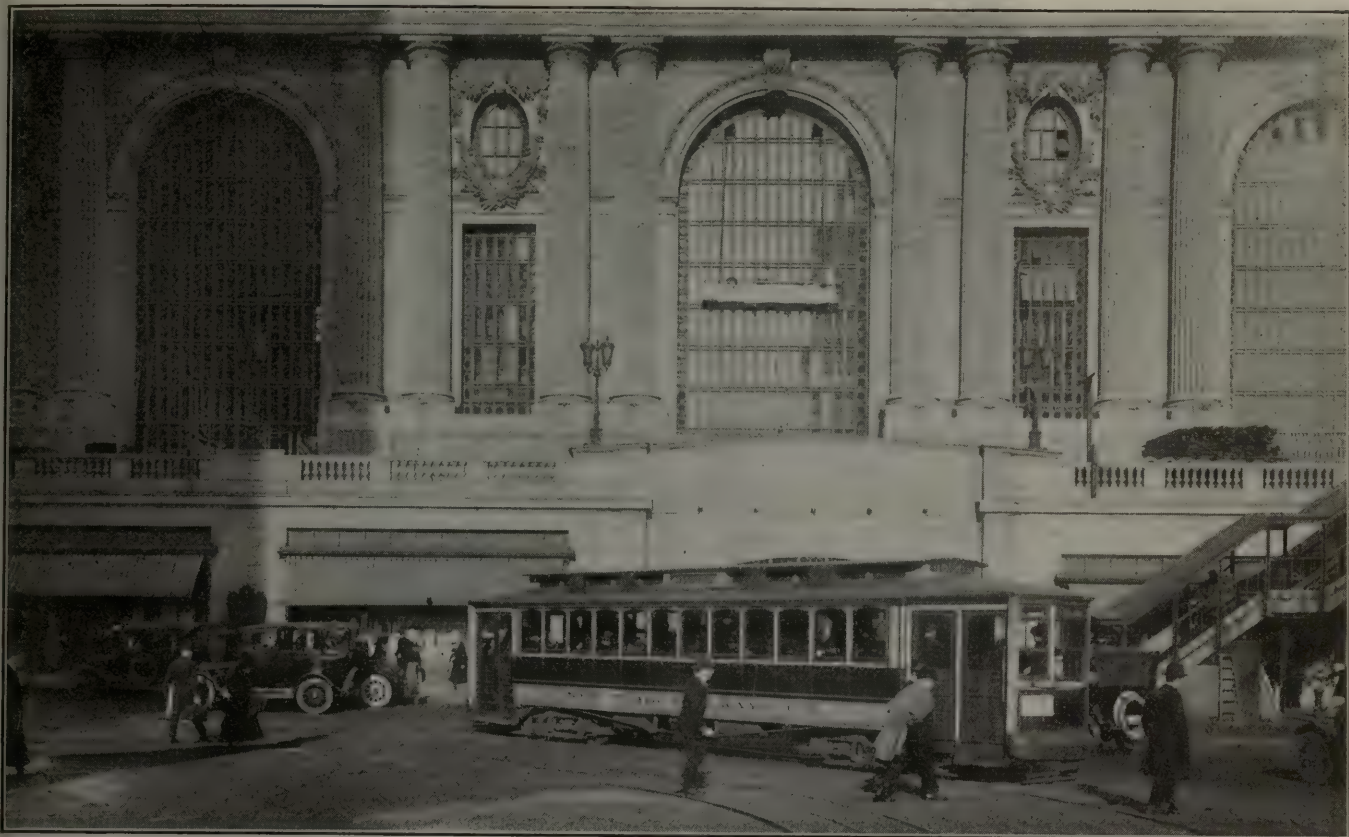
LACKAWANNA, N. Y.

ATLANTA
BOSTON
BUFFALO

CHICAGO
CINCINNATI
CLEVELAND

DETROIT
NEW YORK
PHILADELPHIA

ST. LOUIS
SAN FRANCISCO
HAVANA



439

New York Railways Cars Use National Pneumatic Safety Interlocking Door Control

That the problem of increasing both the speed and safety features of the all-enclosed car is met by National Pneumatic Safety Interlocking Door Control is indicated by the recent order from the New York Railways for the equipment of 439 cars.

With this apparatus a car cannot start until the doors are closed; but when the doors are closed the car starts automatically and instantaneously on the first point of the controller.

NATIONAL PNEUMATIC COMPANY



50 Church St. New York

515 Laflin St. Chicago



Showing recorder location on one of the cars of the Connecticut Company

The Power Wasted at the Brake Shoes Is the True Index of Motormen's Relative Efficiency

It is perfectly obvious that if a car is, on the average, carried a given distance within a given time with a less amount of power taken out at the brake shoes this result can have been reached only by putting less power into the car.

There are various ways by which this relative consumption of energy may be definitely determined and recorded.

First, you can get at it by measuring the total amount of energy consumed; but large

cars consume more power than small ones, and inefficient old-type motors will eat up more power than cars equipped with modern apparatus.

Second, you can get at it by measuring the amount of "coasting" in the run.

Third, you can get a relative indication of the power actually wasted, i.e., recording the number and duration of braking periods for the run. That's the way you do it with the

Arthur Power-Saving Recorder

With the Arthur Recorder you get your records by a simple, *mechanical, inexpensive* method which not only enables you to educate your platform men to save power but also educates them to the best methods of car operation from every standpoint.

The Arthur Power-Saving Recorder Co.
New Haven, Conn.

"Power wasted is the true measure of the motormen's relative efficiency."

The Electric Railways The Public Service Commissions and The Public

ANOTHER broad sunbeam of encouragement and good cheer for the electric railway industry has burst across the horizon in the shape of the decision of the Oregon State Commission granting a six-cent fare to the Portland (Ore.) company.

Following as this does in the

wake of similar action by Public Service governing bodies in many localities, it is a pretty clear indication that the tide has turned. That the right point of view toward this great question is rapidly being gained by the public. That the electric railways of the country under the steady progression of this point

of view will be able to earn reasonable returns, to give better service, to rehabilitate and improve their properties, to avail themselves of the latest improvements in equipment for all departments.

Every sign of the times points to the belief that bottom has been reached and that from now on there will be a steady, gradual improvement in the condition of the industry.

The Oregon decision is encouraging and important for the public, as well as for the public service companies, not merely for the decision itself, but almost equally for the clear vision reflected in the language of the decision.

Nothing could more clearly express the mutuality of interest of the public and the railway companies than the following:

“If the rates fixed by the commission, while sufficiently high to escape condemnation by the courts as confiscatory, yield only a return insufficient to attract capital into needed public service, it is the public and not the investor who will suffer.

* * *

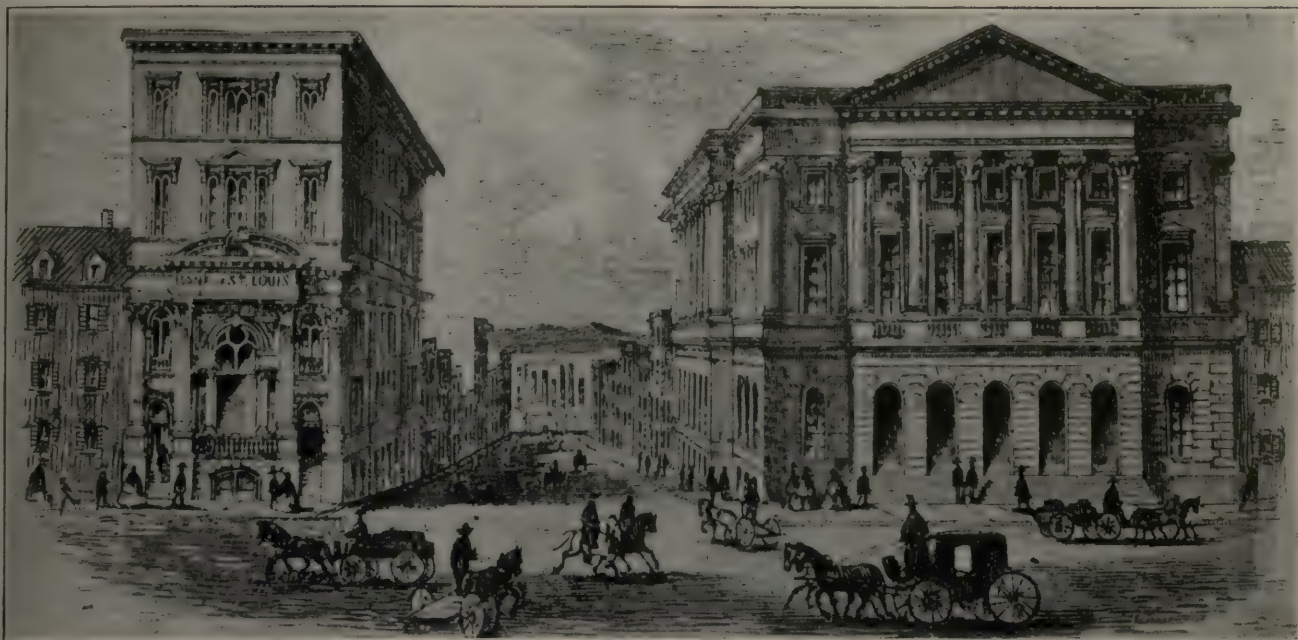
“If any commission should make a practice of enforcing rates which would not attract free capital, it is certain that the community would eventually lose more than it would gain.”

Electric Railway Journal

Tenth Avenue at 36th Street

New York

Member Audit Bureau of Circulations



Long and narrow, ST. LOUIS was compelled to install a public service transportation system nearly a hundred years ago. Sixty years ago St. Louis boasted of 145 omnibuses running on 11 different routes. The vehicles had glass windows and were gaudily painted in bright yellow with fearful landscapes decorating their sides.

Bank of St. Louis and Post Office,
Third and Olive Streets, 1858

But—the Drivers Made All the Profit

Along came a man named Slawson, and invented the fare-box—with the result that receipts jumped by 20% and a score of companies scrambled for franchises to open street car lines. The first car line was opened officially on July 4, 1859, the cars being horse-drawn. By 1882 the street car mileage

had reached 119 miles and the number of passengers carried during the year was 19,600,000. It was about this time that greater car speeds were demanded and cable cars entered the field. Lubrication problems arose in connection with the rapid expansion of the industry and the development of equipment.

Galena Oils *and* Galena Service

were drawn upon heavily to solve the many new difficulties. In 1910 the number of passengers had increased to 335,595,813, of whom one-third used transfers, while the track mileage reached 453. There were 1200 cars, 5800 employees and 90 bridges in the street car service in that year. In 1916, with a population of 690,000,

the city boasted of 510.44 miles of track, 458.72 of which were operated by the United Railways Co., with 1457 passenger cars, 99 trailers and 80 other cars.

Without its far-reaching network of street railways St. Louis could not have expanded and grown to its present importance as the fourth largest city in the United States.

Galena-Signal Oil Co.

Franklin, Pa.



The Erico Portable Welder

Allows You to Weld on Rail Bonds with only two men.

You know a lot better than we do the labor situation in your territory. But we venture to say that this is just the bond welding outfit you want. Weight of Rheostat 140 lbs. Weight of Welder 65 lbs. Rheostat is also adapted for general arc welding work. Write for complete information.

The Electric Railway Improvement Co., Cleveland, Ohio

FMB Grid Resistors

ARE MADE RIGHT AND STAY RIGHT

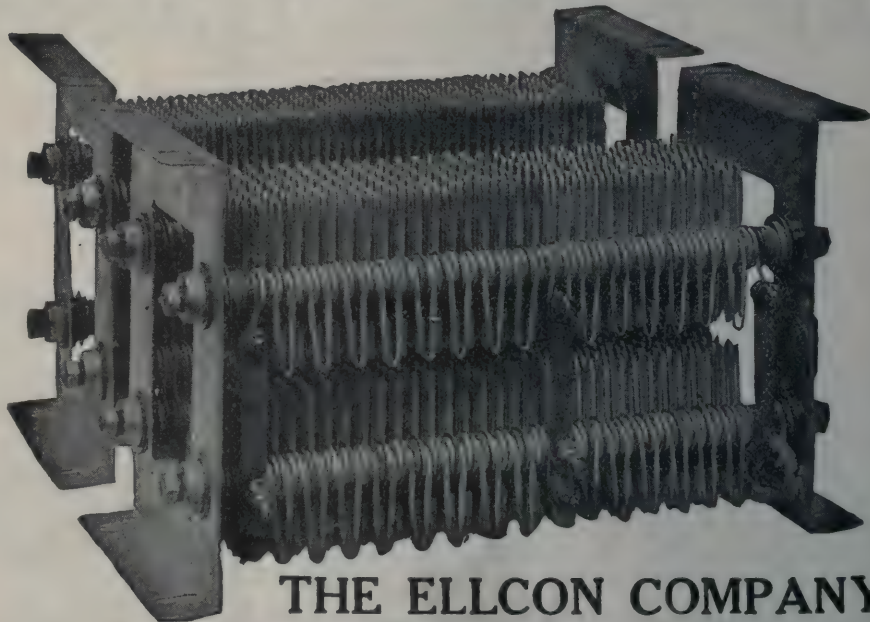
No resistors get more abuse than those under a car.

They are abused electrically by careless operation of the controller.

They are abused mechanically by exposure to dusty, muddy and stone-littered streets.

Until the arrival of E M B drawn, non-corroding grid resistors, troubles from these sources seemed unavoidable.

E M B grid resistors actually have made this part of your equipment troubleproof.



THE ELLCON COMPANY
50 Church Street, New York



Why?

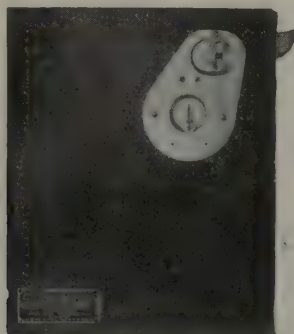
risk antagonizing your patrons by running cold cars and reduced service—

When you can save enormous quantities of coal and give better service by encouraging your men to coast?

They cannot be expected to coast unless they have understandable records of what they do.

Rico Coasting Recorders

PRINT COASTING—THE MOTORMAN UNDERSTANDS



Over 12,000 cars are operating with this device. Can you afford to overlook this opportunity to save real money?

Time is the Essence of Railroading

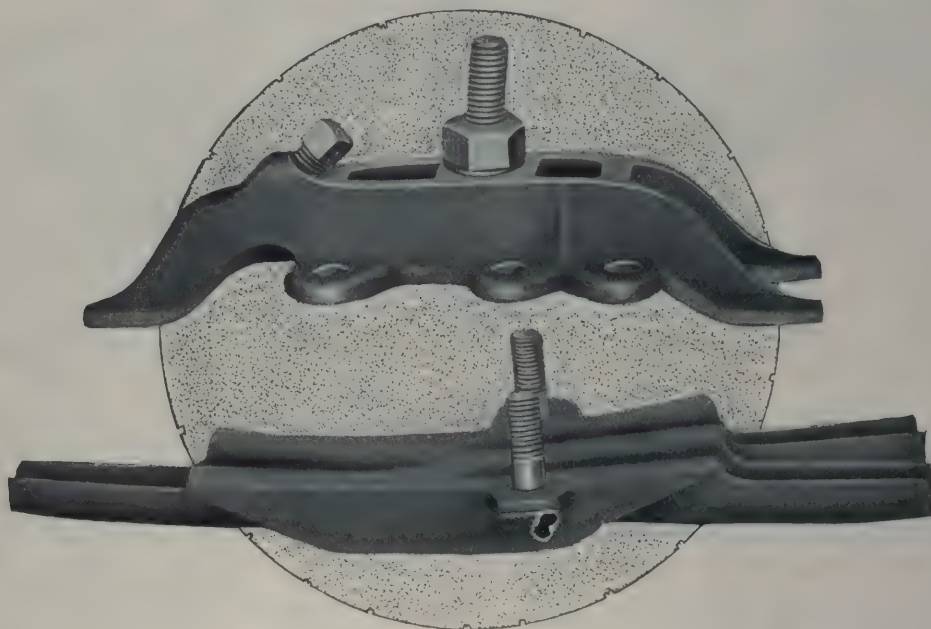
RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK

Trolley Frogs

With Renewable Wearing Pans



Traffic delays, while worn-out frogs are being replaced, mean trouble for company and patron. These delays can be reduced to a minimum if the new Type N light weight trolley frog is used.

The wearing part of this frog is a renewable pan, which can be quickly removed and a new one substituted without disturbing the overhead construction. Only 2 minutes are required for the whole job.

Type N frogs weigh but 7 pounds complete.

General Electric Company

General Office  Schenectady, N. Y.

Sales Offices in All Large Cities

7441

Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, February 9, 1918

Number 6

Rochester Saving Coal, Washington May Follow

THIS issue contains two articles which are of great interest at this time when necessity for saving fuel by everyone is of such paramount importance. One of these articles describes the steps which have actually been taken in Rochester by which, through a few changes in schedules and in operation, 17 per cent of the fuel used to operate electric cars has been saved. This amounts in Rochester to about 100 tons a day.

The other article on the possibilities of coal saving by electric railways is the Renshaw-Lambert-Layng report on their Washington investigation, of which some results were given out by Director Allen of the War Board at the Albany hearing on Jan. 4. This report, of which a copy was submitted to the Public Utilities Commission of the District of Columbia early last month, has just been made public by the War Board. Briefly, it shows that Messrs. Renshaw, Lambert and Layng have applied to the Washington situation a number of the principles of economical service described by Mr. Layng as desirable, in his article in our issue of Jan. 5. The result is that these engineers estimate that in Washington 25,790 tons of coal per year might be saved without impairment of the service to any considerable extent, and their estimates have been checked and approved by a committee of the National Research Council.

At the present time, when the attention of everyone is on fuel economy, exact information of this kind is most valuable to both electric railways and the communities which they serve. It should be of great assistance in calling the attention of both to wasteful practices which ought now certainly to be abolished in the interests of national economy.

Don't Forget the Medal Competitions

IT IS NOT too early for companies to begin planning to capture the Anthony N. Brady safety medal, to be awarded by the American Museum of Safety, and also the medal with which the American Electric Railway Association will recognize conspicuous merit in the papers presented this year before the company sections. Conditions in the electric railway field have of late been conducive neither to large expenditure on safety work nor to literary productivity. Viewed from another angle, however, there should be at least a reasonable incentive, even in 1918, to enter these competitions. If a railway has made a creditable accident record under circumstances like those obtaining at present the award of the medal will mean more to this particular company this year than it would two or three years ago. Similarly in the other competition, while the upset condition

of everything has undoubtedly interfered with company section meetings, the very stress of circumstances has caused some excellent and timely papers to be presented already and it is not too late to have more of this kind prepared. The depressing influence of the war and the absence of the usual association meetings will make it difficult to maintain interest in competitions of any kind for a time, but if they are good in peace time they should be doubly useful now.

Safe Axles for Electric Railway Cars

IT IS FAIR to say that the constant possibility of axle breakage is one of the chief causes of worry of the man responsible for the upkeep of rolling stock. The fundamental necessity of sound axles is evident. At the same time it is not good engineering to put more material into an axle, or into anything else for that matter, than is necessary to allow a proper factor of safety. A correct understanding of the principles which are involved in the safe operation of axles is therefore essential if the risk of breakage is to be minimized and the steel is to be economically disposed.

Compared with that of most structures the theory of the car axle is extremely complicated, in spite of its apparent simplicity. This is due to the nature of the stresses to which an axle is subjected. The hammer blows which it gets when the car passes over track irregularities, the bending moments due to rounding curves, etc., all combine to stress the outer fibers to a great and uncertain extent. The effects of these stresses must be determined from experience, but soundly to interpret the results of experience with a view to safety and, next in importance, economical use of material requires a knowledge of axle theory.

In view of the above facts this journal takes unusual satisfaction in presenting to its readers a series of three articles on interurban car axles by Norman Litchfield, the second of which is printed this week. These articles epitomize the results of years of practical and scientific study of the subject. Mr. Litchfield's point of view is that experience has shown that if certain maximum fiber stresses are not exceeded axles are long-lived. Analysis by well-known principles of mechanics, based upon experimental data and assumptions vindicated by experience, shows how the axle material should be distributed to produce the lowest possible maximum fiber stress. A combination, therefore, of analysis and empirical information must inevitably form the safest possible basis for axle practice. This position is logical—it leaves no place for rule-of-thumb. The best proportions for an axle to fulfill a given set of requirements are not to be settled by sentiment, opinion or compromise. They are logical deductions from the application of ascertainable laws.

We hope that Mr. Litchfield's articles will stimulate the readers of this paper to blow the dust from their old text-books on mechanics and dig deeply in the theorems which may possibly have failed to interest them during school days. This ought to be done, for here is a problem on the solution of which their highest success in part depends.

Commissions Should Be Recognized as Part of the Industry

IN THE development of the principles of public utility regulation, the larger commissions have built up extensive staffs of technical experts. In number of men and in ability, these engineering and transportation staffs are comparable with those of the largest public utility companies within the jurisdiction of the commissions. In some respects, even, these men have a better opportunity to understand the fine points of public utility operation than if they were connected with an operating company because their daily work takes them to many systems and gives them a wider field for observation.

In most cases these staffs have been built up almost entirely by men who have received their original training in railway work with operating companies. Indeed, there are several cases where commission officials have been invited to accept the highest executive offices in railway companies, as well as the converse, namely, where prominent public utility officials have resigned to enter into commission employ. These cases are bound to become more common in future because commissions will naturally desire to strengthen their forces by the best material available. The result of this situation is that there has been introduced, almost insensibly, into the electric railway industry a third component to supplement the two parts into which the industry has always traditionally been divided, namely, into operators and manufacturers.

We believe that every railway man as well as all others who have the best interests of the railways at heart will welcome this condition. The better the public utility commissions understand electric railway practice and the abler their technical staffs, the better and fairer will their regulation be. But it would help if there was a more general recognition by the companies of the fact that the commissions and their staffs form a component part of the industry and one from which help in solving their technical problems may be expected.

How can this be done? One opportunity is in association work, if the time ever comes when association activity can recommence and be conducted as it was before the declaration of war. Fortunately the constitution of the association puts no bar in the way of such wider participation in the work of the association by representatives of public utility commissions. Members of the staff of any commission, as well as the commissioners themselves, can join the association as individual members. But we believe the association could well go farther than that. These men should be led to understand that they are especially welcome at association gatherings, and their place in the industry could well be recognized by the appointment of individuals on various committees.

At one time there was considerable opposition to the

admission of manufacturers to full membership in the association and to their appointment on association committees. This has now largely disappeared, and most of the important committees of the American and Engineering associations now include members from the manufacturing sides of the industry. The War Board is the principal exception to this rule; just why we do not know, but even here its important fuel conservation report was prepared by manufacturers.

The same good results which followed the recognition of the manufacturers as an important part of the industry by the association should follow the extension of a similar recognition to the commissions. After all, it makes little or no difference whether a traffic expert or transportation engineer is with an operating company, with a manufacturing company, or with a commission if he understands his business and can offer help to improve conditions.

The ELECTRIC RAILWAY JOURNAL does not intend to preach anything which it does not practise. We welcome contributions from technical men connected with commissions on problems in the industry just as much as we welcome discussions on the same subjects from operating officials. We endeavor to make the paper as much a paper for commissions as for railway men and to discuss commission problems, so far as they relate to electric railway matters, as we do problems directly connected with electric railway operation.

Greater Output and Higher Efficiency the Goal

COAL saving, though important, is not the only objective before electric railway operators. As more men in this country are called to engage in military service, those in the remaining "essential industries" like railroading must see that there is no diminution in the effectiveness of the properties in their charge, because of this man scarcity.

If ever there was a time when the electric railways—and everyone else—had an opportunity as well as a duty to practise efficiency it is now. Efficiency is being forced on us every day. Whether the subject is willing or unwilling, he gets his share. From the smallest home, where we are being educated to the most economical use of fuel and food, to the greatest corporation—these principles are being preached daily. The executive who was too dense or too cautious to put theory into practice before can hardly escape this war-time education to avoid waste, which is forced upon him by circumstances.

From this universal demand for greater individual output and greater individual efficiency no one is exempt, from the president down. The larger problems, of course, fall to the executive for solution, but the microscope must be applied to every department to discover where corrective measures are necessary and practicable.

Nor will the wise manager be content to put the brakes on extravagant expenditures. Opportunities are at hand on almost every property to get new business—to increase gross revenues. In some cases it is the first real opening for taking on freight business, turned aside for the present by steam roads. Once secured this business need not be lost. Motor truck transportation agencies are already going after it.

In still more cases the opportunity lies in the education of the platform employees. Many "fares" are driven to the necessity of walking or to competitive companies by failure of conductors or motormen to give them a chance to get aboard. Others are lost by lack of interest where a crew delayed by blockade idly awaits the wrecking wagon instead of trying to remove the cause.

The executive who does not learn his lesson from the present emergency may never have another chance. These critical times will be the making or breaking of many a system. It behooves all to "speed up." It is "our present and immediate task."

Duplication of Service Must Be Eliminated

WHILE the tidal wave of jitney competition which swept over the country from the Pacific to the Atlantic a couple of years ago has receded to a marked degree, the jitney is still seriously affecting electric railway earnings, notably in the Middle West and on the Pacific Coast. This fact is emphasized by the testimony presented at recent rate hearings before both the Indiana and California commissions and reported in contemporaneous issues of this journal.

We are told by those best in position to know that to win the war will require the utmost in service from both the human and material make-up of the country. This above all is not a time for competing businesses. Co-operation must be the order of the day. With this thought in mind the federal government recently took over the major transportation facilities of the country. Men engaged in useless work—useless as far as winning the war is concerned—must turn their energies to useful work. Yet we see municipalities permitting competition in local transportation systems—competition which duplicates not only precious man power, but precious fuel and munition power as well. It is not the intention here to discuss the respective merits of the electric railway and the jitney as means of local transportation. Let the matter rest on duplication of service only. The question may fairly be put up to any municipality, "Which will you have, electric railways or jitneys? You can have one of the two but not both." Can any sane man doubt what the answer would be?

The trouble is that the public is particularly prone not to worry about crossing a bridge before it gets to it. It only wakes up when the ruins finally crash. Within the year this has been well illustrated by the sudden awakening of public interest in the local transportation systems of several communities after these systems had passed under the auctioneer's hammer to the junk man. It is (not should be) a matter of community patriotism that where two competing transportation systems exist one must be eliminated. Which shall it be? In a final show of hands there would be no question as to the answer. But community patriotism must be aroused on this point. In the matter of "that the people may know" most of our railways have possessed an amount of lethargy quite comparable to that possessed by the public in matters of community interest. The problems of the railways must be stated freely and frankly. After all, they are the people's railways. Sane, wide-open publicity is about the only hope for those railways which are now going to the wall on account of jitney depredations.

Labor and Capital Should Come Together

ONE of the most striking developments of the war has been the changed condition of labor in Europe. It is impossible to disregard the significance of the fires raging socially in Russia and seemingly kindling in Austria and even Germany, or the power which labor now has in England. In our own country Charles M. Schwab said ten days ago that the worker was to dominate the world.

A more temperate statement, but somewhat along the same lines, is that of former Supreme Court Justice Hughes, who said before the New York Bar Association last month: "Individual privilege [in the future] will have to show cause before a public to which old traditions are no longer controlling—a public trained in sacrifice—which will enforce its own estimate of the common right." And again he said, "The present exercise of authority over the lives of men will hereafter find its counterpart in a more liberal exercise of power over the conduct, opportunities and possessions of men."

Mr. Schwab and Justice Hughes had the courage to recognize the changing order. Many employers, however, will undoubtedly refuse to do so and will declare that labor already has too much and that no one shall dictate to them how they shall conduct their enterprises. Similarly, there are extremists among labor. If these two are left to lead us out of difficulties, the country will suffer. It is for the moderates on both sides to compose the differences.

In the electric railway field the situation presents a different aspect than in industrial work, as far as wages are concerned, because the rate which companies can charge for their service is restricted while the wages which they may be forced to pay, either because of market rates or through arbitration agreements, have no such limit. One step to place electric railways on an equal footing with other large employers of labor would be to have a flexible fare, depending in amount on the wages paid or, better still, on the entire cost of operation. Such a plan is recognized in the new Philadelphia franchise as well as in the Cleveland Talyer plan. Still another step would be to make the wages in turn depend upon the three main factors which should control them, namely (1) the cost of living, (2) the efficiency of the workmen either individually or in groups and (3) the profits of the company, the influence of each factor on the total wages to be determined in some equitable manner.

This much is certain. In the period after the war, or perhaps before the close of the war, there must be some plan evolved to cover the relations between electric railway employers and employees which will be more logical and more just than the present one of a struggle of might.

Soon there will meet in Washington a Labor Policy Board. It will hold the balances for our general industrial peace. There must be give-and-take—compromise. Both sides must surrender much that they value highly. Far-seeing employers are ready to make sacrifices. So, too, are the forward-looking labor leaders. The interests of the country demand that both sides look carefully to it that they be not misrepresented.

Above all, let both be prepared for large concessions. In that direction lies peace and the country's good.

Combining Loads to Gain Economies of Large Units and High Diversity Factor—I

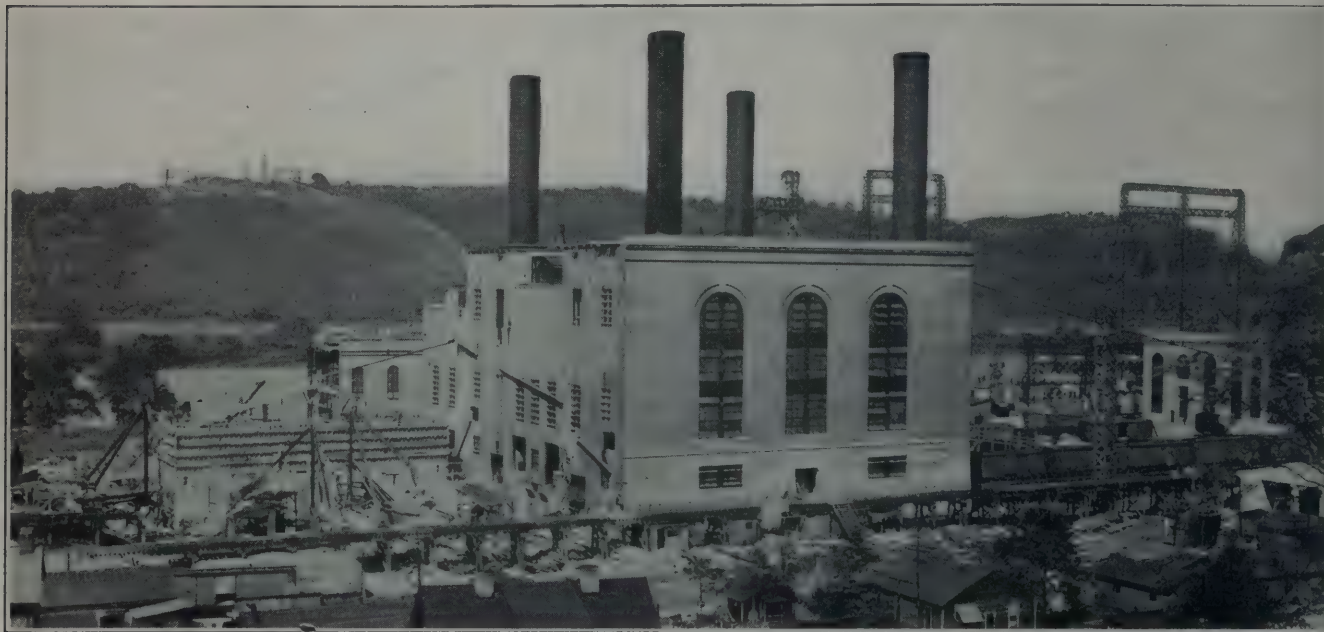


FIG. 1—GENERAL VIEW OF WINDSOR POWER PLANT

THE centralization of the power-generating facilities of one of the great industrial sections of the country into a single plant of enormous capacity, situated at the most advantageous location to serve the territory, is the idea behind the joint construction of the 200,000-kw. Windsor (W. Va.) power

plant of the West Penn Power Company, a subsidiary of the West Penn Railways, and the American Gas & Electric Company. It is considered to be, in a sense, a pioneer project in that it is the first steam station to be built as a bulk supply source of electrical energy. The economies to be realized from extremely large units, the diversity factor resulting from the combination of loads spread over a large territory and including a wide variety of industry, and the strategic location relative to the raw materials and loads, were the desiderata which led these two important companies to combine their generating facilities and thus make an arrangement which would supply steam-generated electrical energy so cheaply that it could be economically distributed over wide areas. The scheme when completed will compare favorably as to energy cost with the large hydro-electric developments of the West, which distribute their output through long distances.

The West Penn Power Company, which is the energy supply company for the West Penn Railways, and the

West Penn Power Company and American Gas & Electric Company Place Their Combined Demands on Huge Jointly Owned Generating Plant—New Power House of Six Units and 200,000-Kw. Capacity Is Strategically Located with Reference to Loads and Coal and Water Supplies, and Embodies Many New Features of Design

American Gas & Electric Company combined, supply practically all of the commercial and electric railway energy requirements of southwestern Pennsylvania, northwestern West Virginia and eastern Ohio, a particularly rich industrial section in the valley of the Ohio River. The American Gas & Electric

Company supplies light and power service to Scranton, Pa., Newark and Canton, Ohio, Wheeling, W. Va., and a number of other communities and industries in this section. The West Penn Power Company supplies energy to the 322.56 miles of electric railway and more than 400 cars of the West Penn Railways, and commercial energy to numerous towns along these railway lines and elsewhere in this territory. The loads of each company are superimposed on those of the other at the common power plant. Each company takes its supply of energy from the station through its individual outdoor step-up and metering substation and transmits it out over a network of high-tension lines serving the many communities and industries and electric railways in the three states.

One of the important problems in connection with this new plant was the selection of the most advantageous location, all things considered. The site finally chosen comprises 58 acres of inexpensive real estate along the Ohio River from which an adequate and de-

pendable supply of reasonably good water is obtainable. The station thus situated is but 2000 ft. from a coal mine producing fuel with a heat value running around 13,500 B.t.u. per pound, and is on the Pittsburgh, Wheeling & Kentucky branch of the Pennsylvania Railroad, affording direct transportation from other coal mines, should the one at the power plant be shut down. It is practically at the load center of the territory served, and is about midway between the Eastern and Central time belt, whereby the advantages of diversity resulting from serving loads thrown on the power-house at times differing by one hour are added to the more usual diversity advantages from the wide variety and character of load supplied.

GENERAL LAYOUT OF WINDSOR STATION

In general the Windsor plant is laid out on the unit plan with four boilers and one 30,000-kw. turbo-generator per unit. These four boilers are arranged in pairs on opposite sides of a wide firing aisle, the four boilers thus occupying about the same space in the longitudinal direction of the plant as the turbo-generator they serve, which is set with its axis parallel to the firing aisle. The firing aisle between the boilers is 47 ft. wide with a 12-ft. opening in the floor through the center of the aisle. The space underneath the floor is used for a huge coal-storage pit, from which coal is handled through the floor opening by means of a crane and bucket hoist, directly into the coal bunkers.

The turbine room occupies a central position in the plant, as the boiler room is on one side and the switch-

ting in an intermediate floor and making an office for the chief engineer and load dispatcher on the second floor. All the main operating rooms are on the same floor level, which was located at an elevation of about 35 ft. above the ground on account of the wide variation of

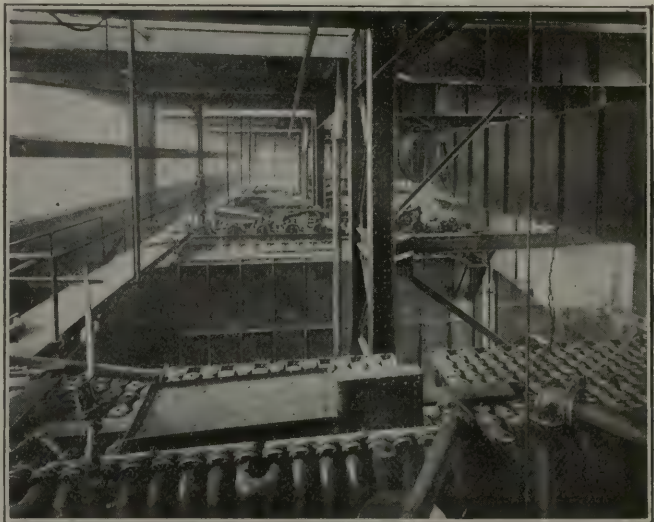


FIG. 3—TWO SECTION ECONOMIZERS OVER BOILERS

the water level in the Ohio River. This uniform floor level will greatly facilitate the operating conveniences in a plant of so large capacity. The high elevation of these floors necessitated running all tracks into the building on trestles. These were costly at the outset,

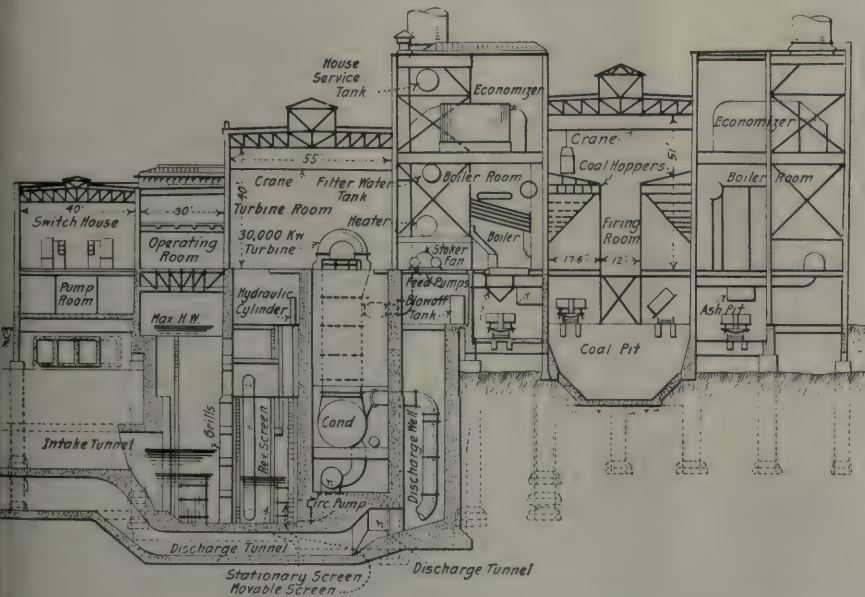


FIG. 2—CROSS-SECTION THROUGH WINDSOR PLANT SHOWING COMPLETE ARRANGEMENT OF EQUIPMENT

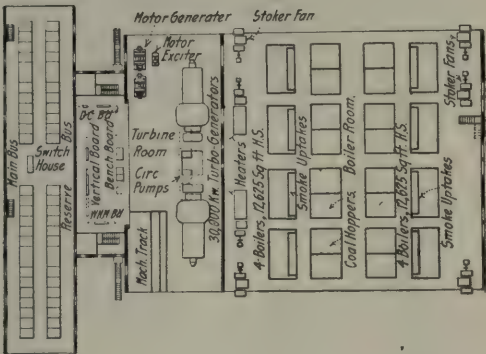


FIG. 4—SIMPLIFIED PLAN OF WINDSOR PLANT SHOWING COMPLETE LAYOUT OF TWO UNITS OF STATION EQUIPMENT

board operating room and switch house on the other. The switchboard operating room is built directly over the intake well and is supported on 6-ft. steel trusses which span the space between the turbine room wall and the wall of the switch house, but which are placed in such a way as not to interfere with ready access to the well for the necessary frequent cleaning. This space over the intake well has been further utilized by put-

ting in an intermediate floor and making an office for the chief engineer and load dispatcher on the second floor. All the main operating rooms are on the same floor level, which was located at an elevation of about 35 ft. above the ground on account of the wide variation of

but the space beneath them will make an economical ash dump for several years to come. Two of the 30,000-kw. units are now in operation, and it is expected that two additional units will be completed in 1918. The last two units to make up the present-planned ultimate capacity of nearly 200,000 kw. will be installed shortly thereafter. All of these turbines will be placed in a single row through the turbine room

with axes parallel to the length of the building. The boilers to serve them will be set in two rows as described above, with steel stacks on each side, one for each three boilers. When completed with the six units installed, the over-all dimensions of the power house will be roughly 295 ft. x 280 ft.

The present article covers, in addition to the general features already mentioned, the boiler room and coal handling equipment. In a later article the turbine room, water supply, electrical and control equipment, electrical distribution system, etc., will be taken up.

FEATURES OF BOILER-ROOM DESIGN

Each of the boilers in the Windsor plant is of the Babcock & Wilcox cross-drum type with 12,625 sq. ft. of heating surface. Each is equipped with a separate economizer and with both induced and forced

cause of their proved efficiency in burning West Virginia coal, and because of their heavy overload capacity.

The Sturtevant high-pressure-type economizers, which have 8625 sq. ft. of heating surface, are arranged in two sections, eight tubes wide and thirty-six tubes long, in order to secure what is believed to be a maximum heat transfer arrangement. This also allows the space between the two sections to be utilized for a by-pass duct and a duct connecting with the double-suction fan behind the economizer. Such an arrangement of the economizer makes possible a narrower construction and one more readily accessible for repairs and cleaning.

The dampers installed in the uptake are so arranged that in one position they close off the economizer and open up a by-pass duct, and in the other position they open the path through the economizer and cut off the by-pass. The gases pass from the economizer and induced-



FIG. 5—GENERAL VIEW OF OPERATORS' COLONY

draft so arranged and controlled that the pressure in the firebox is practically zero. The induced draft fan is set over the boiler and inserted between the economizer and breeching. It is driven by a 60-hp. motor. The forced-draft or stoker blast is supplied by a blower installed behind the furnace. It is driven by a 100-hp. motor and was designed to give a pressure equal to $6\frac{1}{2}$ in. of water. Hand regulation of the dual draft arrangement is employed to gain the proper proportions of fuel and air.

The boilers are equipped with Westinghouse underfeed stokers with fourteen retorts per boiler. Steam is supplied at 250 lb. pressure and 250 deg. superheat. All boiler settings are incased in steel to prevent air leakage, and each boiler is equipped with a Diamond Power Specialty Company soot cleaner.

The two pairs of boilers on opposite sides of the firing aisle which go to make up a single bank are interconnected by means of a steam pipe which is carried over the aisle up close to the roof, in order to clear the crane-way. This connects with a steam header which in turn connects with the turbine. These headers for the separate banks of boilers are connected together to allow interchange of steam from the boilers of one unit to the turbine of another unit. An arrangement which provides an extra large furnace and insures a good combustion of fuel is brought about in the boiler setting by placing the drum $26\frac{1}{2}$ ft. above the firing-aisle floor.

Coal is supplied to the stokers from the bunkers along the front of the boilers by gravity. The underfeed type stokers were chosen for use in the Windsor plant be-

cause of their proved efficiency in burning West Virginia coal, and because of their heavy overload capacity. The Sturtevant high-pressure-type economizers, which have 8625 sq. ft. of heating surface, are arranged in two sections, eight tubes wide and thirty-six tubes long, in order to secure what is believed to be a maximum heat transfer arrangement. This also allows the space between the two sections to be utilized for a by-pass duct and a duct connecting with the double-suction fan behind the economizer. Such an arrangement of the economizer makes possible a narrower construction and one more readily accessible for repairs and cleaning.

METHOD OF HANDLING COAL

One of the interesting features in connection with the boiler end of the plant is the plan which has been utilized for the handling of coal and ashes.

Coal is secured under a long-term contract from a mine owned by the Richmond Coal Company, situated about 2000 ft. from the power house. The mine cars bring the coal out of the mine and dump it into a crusher which delivers the coal into bunkers below, from whence it is drawn by gravity into standard-gage, side-dump cars. These cars, owned by the central station company, are then taken into the power house on a track which extends underneath the boiler-room firing-aisle floor, where the coal is dumped into a concrete pit extending the entire length of the boiler house. The fact that these cars are standard gage is considered important, since in an emergency it will permit the shipment of fuel from other mines without transferring from one car to another.

The pit underneath the firing aisle measures about 35 ft. wide by 24 ft. deep below the tracks, and extends the entire length of the boiler room. Its capacity is about 2500 tons. From this pit the coal is lifted by means of a 3-yd. grab bucket and overhead traveling crane, weighed by a device on the crane and dumped into the individual hoppers serving each boiler. This scheme of

Saving Fuel Through Operating Economies

Committee of Engineers Shows How More Than 25,000 Tons of Coal Can Be Saved Yearly on Washington Electric Railways

THE Electric Railway War Board has just made public the text of the report made last December by the committee appointed to investigate the fuel savings possible on the lines of the Washington Railway & Electric Company, and the Capital Traction Company in Washington, D. C. The experts who prepared the report consisted of Clarence Renshaw and M. B. Lambert of the Westinghouse Electric & Manufacturing Company, and J. F. Layng of the General Electric Company. The committee's recommendations involve the use of skip, or stagger stops, the elimination of such car-mileage as can be spared without hardship to the public, the reduction of heat in cars, the operation of the most economical power houses or power plants, and the staggering of office hours of government departments. The War Board also made public an indorsement of the report dated Jan. 3 and signed by L. B. Stilwell, W. F. Durand and Comfort A. Adams, as members of a sub-committee of the National Research Council, also letters from John A. Beeler and Louis Brownlow, consulting engineer and chairman respectively, of the Public Utilities Commission of Washington, to whom the report had been submitted. Mr. Beeler, writing under date of Jan. 7, said there was no question in his mind but that the proper and intelligent application of the methods

Coal Savings Possible

The report by Messrs. Renshaw, Lambert and Layng estimates that an annual saving in coal of 25,790 tons could be made by the Washington electric railways, as follows:

Source of Saving	Tons Per Year
Skip-stop plan	9,400
Double berthing and modifying rapid-transit stops....	600
Eliminating unnecessary mileage in non-rush hours.	3,220
Reducing heat 50 per cent..	2,250
Shutting down small plants to effect the same load reduction as would carrying all Capital Traction Company's load by Potomac Power Company	9,700
Staggering office hours of government departments	620
Total	25,790

advocated in the report would conserve fuel and energy, as estimated, while the rapid transit facilities afforded the public in the district should be improved because of the decreased time required to make each trip. Mr. Brownlow expressed the belief "that changes of the nature suggested can be put through so as to effect savings at least as great as those indicated."

The report of the committee is substantially as follows:

The Washington Railway & Electric Company (the Potomac Power Company) averaged during the year ending October, 1917, approximately 9500 tons of coal per month with an economy of approximately 1.9 lb. per kilowatt-hour, and generated an average of approximately 11,000,000 kw.-hr. per month. About 52 per cent of

this output was used for lighting, 13 per cent for the three interurban railways (W. B. & A., W. & Va. and W. & O. D.) entering Washington, and 35 per cent for the city and suburban lines of the Washington Railway & Electric Company.

The Capital Traction Company, at its Georgetown power house, averaged approximately 2800 tons of coal per month with an economy of approximately 2.6 lb. per kilowatt-hour, and generated an average of approximately 2,200,000 kw.-hr. per month. At its Chevy Chase power house it averaged approximately 460 tons per

(Concluded from page 266)

handling the coal permits of the storage of a rather large quantity of fuel within the power house without great expense, since it was possible to construct the storage bin of concrete rather than of steel. A large coal-storage yard will be provided near the plant in the near future.

A standard-gage track underneath each row of boilers permits of the dumping of ash from the hoppers under the furnaces directly into dump cars for removal. This arrangement is clearly shown in the cross-section of the plant.

Owing to the necessity of radiating great quantities of heat from the large turbine units the design of the power house was made especially liberal with regard to light and air. The large amount of heat radiated is saved in part, however, by conducting the warm air from the generators to the basement of the boiler room, where it is taken up by the stoker fans and delivered to the furnaces.

In the early construction stages of the building the difficulty of securing a solid footing under the boiler room and switch house was met by sinking caissons. It is interesting to note, however, that it was unnecessary to carry out this method of construction beneath the remainder of the station, since it was possible to utilize the walls and foundations of the deep condenser wells and intake crib to support the superstructure. The condenser well walls also serve the further purpose of foundations for the turbo-generators.

Sargent and Lundy, consulting engineers, of Chicago, were the designers of the Windsor station, and they also have charge of the construction work. The high-tension yard of the American Gas & Electric Company was engineered and constructed by the Electric Bond & Share Company. The sub-contracts for the building foundations, high tension yard foundations, and the railroad trestle foundations were all awarded to the Foundation Company of America. The sub-contractor for the steel work was the Riverside Bridge Company.

month with an economy of 4.1 lb. per kilowatt-hour, and generated approximately 240,000 kw-hr. per month. The entire output of both of these stations is used for railway purposes.

Owing to the way in which the streets are laid out in Washington street corners occur at very irregular intervals. Not only are some corners very close together, but the average number of street corners per mile is high. Assuming the Georgetown line of the Washington Railway & Electric Company to be typical, the possible stopping points average about thirteen per mile, and even in the non-rush hours it is considered necessary to make a large proportion of these stops. Observations on several city lines in the middle of the day showed that the cars were making from 8.6 to 9.5 stops per mile. While owing to the limited time the committee did not personally investigate the suburban lines, it is understood that the number of stops on these, considering the character of the lines, is proportionately excessive.

A peculiar custom in Washington is the making of what are called "fire stops." In front of the buildings in which fire protective apparatus is housed and before crossing certain streets which are commonly used by fire apparatus the cars are required to stop. The cars of the two companies make approximately 53,000 of these stops every day. Some of these fire stops would, of course, have to be made in any case to take on or let off passengers, but assuming that one-half of them would have to be made for this reason, even if the fire ordinance was not in effect, it is estimated that the coal consumed by making the other half of these fire stops is at least 880 tons per year.

In order that any rational skip-stop plan may be put in effect, it will be necessary to eliminate these fire stops. From a rough study of the Georgetown line of the Washington Railway & Electric Company, it is estimated that the number of stopping points on the various lines can be reduced approximately 40 per cent, and that the number of stops made will then be reduced approximately 25 per cent as compared with those made at present without any hardship to the public. This reduction in the number of stops should effect a saving of at least one-eighth of the coal used for railway purposes, equivalent to 780 tons per month, or 9400 tons per year.

Even on the basis assumed, the number of stopping points on city lines still would be a little more than eight per mile, or slightly less than 660 ft. apart. Even allowing for some irregularity, no persons on this basis should have to walk more than about 400 ft. beyond the point to which he would go at present (the average would be very much less than this). Even this maximum distance would mean a walk of only $1\frac{1}{2}$ minutes.

The committee believes that the use of skip stops in Washington would effect great improvement in the service and greatly reduce the street congestion.

In most cities where the skip-stop plan is used no stops are skipped in the downtown district. In Washington, however, it is very necessary and desirable to skip stops in this district and the outlying ones, and the above estimate has been based on doing this.

Another practice which is noticeable in Washington is the way in which a car will often make two or even

three stops at a single corner. If one car has stopped at the corner a second car will often stop behind it. This car will not take on or let off passengers, however, but will wait until the first car moves on and will then pull up to the corner to load or unload. Under such circumstances, the second car should take on or let off its passengers at the original stop behind the first car and it should then go on when ready without stopping at the corner.

It is also the custom to stop all cars at rapid-transit crossings. The committee suggests that at such crossings one or the other line have right of way and that under normal circumstances the cars should merely slow down instead of actually stopping.

It is difficult to estimate just what the above two changes would save, but the saving would amount to at least 600 tons per year, and in combination with the skip-stop plan would give a total saving of 10,000 tons.

ELIMINATION OF UNNECESSARY CAR-MILEAGE

While short-line or turn-back cars are employed to a considerable extent in Washington, there seems to be a tendency, as in other cities, to run an unnecessary number of cars to the far end of certain lines, in some cases giving six-minute headway where ten or twelve-minute headway would be sufficient. A considerable saving in coal can be effected without any hardship to the public by eliminating this unnecessary service.

On the Capital Traction Company's lines, for instance, during the non-rush hours one-half the Colorado Avenue cars of the Fourteenth Street line could be turned back at Decatur Street, and on the other end could be turned at First and B Streets. It is also believed that all of the cars of this line which now run to Decatur Street could be turned back at Park Road. Further the F and G Street cars of the Pennsylvania Avenue line could run only between Twenty-sixth Street and Pennsylvania Avenue, N. W., and First and B Streets, S. E. One-half the Eighth and F Street cars of the Georgetown line could be run to Union Station only instead of to Eighth and F Streets. In addition to the above, there are certain savings which could be made in the early morning and late evening hours.

On the lines of the Washington Railway & Electric Company the committee did not pick out specific cases, but assumed that the same proportion of the total daily mileage could be eliminated in a similar way.

The elimination of this unnecessary mileage would save approximately 1300 tons of coal per year for the Capital Traction Company and 1920 tons for the Washington Railway & Electric Company, or a total of 3220 tons. In addition some dead mileage could be saved during the rush hours, but no attempt was made to estimate the extent of this.

The difference in the average energy consumption per car-mile for the seven months in which heat is used as compared with the five months in which heat is not used is 0.58 kw-hr. per car-mile for the Washington Railway & Electric Company, and 0.4 kw-hr. for the Capital Traction Company. Assuming that 85 per cent of this difference is due to the use of the heaters, the total coal for heating purposes is 4500 tons per year for the two roads.

A test made by the Capital Traction Company on Dec. 5 showed that the output of its plant during the

rush hours (7.30 to 10 a. m. and 4 to 7 p. m.) was approximately 36.5 per cent of the output for the day. Using this figure for a basis, it is assumed that the car-mileage during rush hours is roughly one-third of the total. The heat used during rush hours should, therefore, require approximately 1500 tons of coal per year, and by eliminating the heat entirely during this period and using it as at present during the remaining time this amount of coal should be saved.

If, instead of cutting off all heat during rush hours, one-half the heat were cut off for the entire day, the saving would be approximately 2250 tons of coal per year instead of 1500 tons. The committee believes that if reasonable judgment is used and competent supervision is given to the matter of cutting off heat, instead of working on an entirely arbitrary basis, one-half of the coal now used, or 2250 tons per year, can be saved, with practically no discomfort to the public.

OPERATION OF MOST ECONOMICAL POWER HOUSES OR POWER PLANTS

As already indicated, the Washington Railway & Electric Company, on account of the much greater capacity of its station and the higher load factor of its output, is able to operate with 1.9 lb. of coal per kilowatt-hour as compared with 2.6 lb. and 4.1 lb. respectively for the two stations of the Capital Traction Company. If the entire load could be carried by the Washington Railway & Electric Company's plant and the others shut down a considerable saving in coal would result. Making suitable allowance for losses in transmission, the saving in coal from shutting down these plants is estimated at approximately 2300 tons per year for Chevy Chase and 7400 tons per year for Georgetown, a total of 9700 tons.

To permit the stations of the Capital Traction Company to be shut down, however, would require the purchase of rotary converters with transformers, etc., for the Chevy Chase plant as well as the building of certain high-tension lines. The capacity of other high-tension lines would have to be increased. Some of these would be underground lines and would require new ducts as well as new feeders.

The Capital Traction Company's power houses, although less economical than those of the Washington Railway & Electric Company, are still very efficient. The difference in the unit coal consumption is brought about by the smaller size of the power stations and also because the load factor is that of a purely railway load as against that of a combined railway and lighting load on the other plants. In Washington there are many plants which are now operating in hotels, government buildings and elsewhere which are reported to require 8 to 10 lb. of coal per kilowatt-hour. Many of these plants are already provided with Washington Railway & Electric Company's service and use this service during the summer. A much more rational plan for conserving the coal supply of the nation therefore would be to shut down these small plants rather than that of the Capital Traction Company. It might even be desirable to use the plants of the Capital Traction Company to supplement the Washington Railway & Electric Company's plants, and thus provide more power, as the Capital Traction Company's plants are

not fully loaded. This would permit the shutting down of more small uneconomical plants than would otherwise be possible.

The committee understood that the coal burned by the total of such plants in the city is much greater than that of the Capital Traction Company. To be conservative, however, there was included in the summary of coal which can be saved only the amount which could be saved by eliminating the power stations of the Capital Traction Company (9700 tons), although it is the idea that this would be saved not by shutting down these stations but as indicated above.

STAGGERING OFFICE HOURS OF GOVERNMENT DEPARTMENTS

From the best information available there are nearly 50,000 government department employees who are dismissed each day at 4.30 p. m. The two railway companies together operate 271 cars during the midday non-rush hours, the number being gradually increased to 390 at 4 p. m. and to a maximum of approximately 545 at 5 p. m. There is thus an increase of 155 cars after 4 p. m. which can, in a general way, be attributed to the necessity for carrying the department employees.

At present it seems probable that most of these 155 cars make only about two round trips. If the office hours were staggered so as to begin at fifteen minutes intervals from 8.30 a. m. to 9.15 a. m. and to close correspondingly from 4 p. m. to 4.45 p. m., considerable relief could be obtained in street congestion and a saving effected in coal. At the same time the committee believes that the change would not be so radical as to cause hardship to the employees or to interfere with the necessary relations between the several departments or between the general business community and the departments.

It is estimated that on such a basis the rush-hour cars could make three trips instead of two, and that 100 additional cars would be sufficient for carrying the load on the same basis as it is now carried by the 155. Thus the peak load of the Capital Traction Company would be reduced at least 10 per cent, or about 900 kw., and that of the Washington Railway & Electric Company lines about 1470 kw. With this reduction in peak loads there would be less coal required for carrying banked boilers, estimated roughly at 620 tons per year. It might, of course, be that the railway companies would want to operate a greater number of cars than the above in order to carry the people more comfortably than at present and to lose fewer fares from crowding. If this were done the gain obtained would be in the shape of better service rather than in a saving of coal.

By staggering the office hours a greater amount than this the saving might be increased somewhat, but any greater staggering would interfere too much with the business of the departments and the lives of the employees to be feasible at the present time.

SUMMARY

Summarizing the above, the total weight of coal which the committee believes can be readily saved by changes in the operation of the two railway systems, which could be easily effected without impairing the service to any appreciable extent, and by staggering

the office hours of the government departments by an amount sufficiently small to be easily practicable, is as follows:

Source of Saving	Tons Per Year
Skip-stop plan	9,400
Double berthing and modifying rapid-transit stops.....	600
Eliminating unnecessary mileage in non-rush hours.....	3,220
Reducing heat 50 per cent.....	2,250
Shutting down small plants to effect the same load reduction as would carrying all Capital Traction Company's load by Potomac Power Company.....	9,700
Staggering office hours of government departments.....	620
Total	25,790

If heat is shut off during peaks instead of being reduced 50 per cent all day, the saving would be 1500 tons instead of 2250, and the above total would be correspondingly reduced.

Rochester Lines Save Coal

Through Co-operation of Chamber of Commerce and Local Fuel Administrator, Various Operating Economies Are Introduced

BY JAMES F. HAMILTON

General Manager New York State Railways, Rochester Lines

A GOOD example of what can be accomplished by co-operation is shown by the results attained on the Rochester Lines of the New York State Railways in the efforts lately made towards conserving fuel.

The ELECTRIC RAILWAY JOURNAL has already mentioned the appointment, on Jan. 3, by the Public Service Commission, Second District, State of New York, of a committee to study the possibilities of fuel conservation on electric railways, as well as the recommendations drafted as a result of a meeting of this committee in Rochester on Jan. 10. These recommendations were in turn forwarded to all the railway companies in New York State under the Public Service Commission, Second District.

In starting action in the city of Rochester the company realized that any efforts it might make would be futile unless it had the support and co-operation of the directors of local industry and commerce. The Rochester Chamber of Commerce and its energetic secretary, Rolland B. Woodward, presented the means by which this co-operation could be secured. In fact, to Mr. Woodward and Local Coal Administrator M. R. Miller, also a member of the Chamber, are due the real credit for the steadiness and speed with which the electric railways and the industries of Rochester were induced to work uninterruptedly toward the same economic end. It also must be recorded that every meeting held by the Chamber of Commerce for this purpose was unanimous in its action, and this could not have taken place unless the executive heads of all of Rochester's great industries had been unselfishly anxious to assist.

As a preliminary to effective action, the Chamber of Commerce appointed a committee under the chairmanship of J. T. Hutchings, vice-president of the company which furnishes Rochester with its electrical power as well as gas, who at once started the work of the committee.

To the end of reducing the number of cars operated in the rush hours, a study was made as to the location of all the factories, manufacturing plants, department stores, etc., as to the number of persons employed in

them and as to their requirements as regards street car service.

The city of Rochester is peculiar in the fact that its geographical and business centers practically coincide. Most of the transferring from one line to another is done in this common center. It was soon learned that the opening and closing time of the various industrial plants, stores, etc., was the important factor to be considered.

Within twenty-four hours, a tentative schedule was made whereby the opening and closing time was staggered in such a manner as to permit cars to secure full complements of passengers at both ends of their routes. This change in schedule received the ready support and co-operation of all interests and has been in effect fourteen days. It has enabled the company to discontinue the use of twenty cars during the morning rush hours and thirty cars during the evening rush hours. The accompanying table shows the actual hours adopted.

SAVING IN HEAT AND LIGHT

Another surprising result which has been attained has been the saving of from 30 lb. to 50 lb. of coal per car per day ordinarily used to heat the cars, making a total saving of approximately 225 tons per month. All cars on the Rochester system are equipped with coal boxes which were filled each night at the various stations by the mechanical department. As the crews of

STAGGERED HOURS OF OPENING AND CLOSING ROCHESTER'S INDUSTRIAL PLANTS				
Industries	Opening Hours		Closing Hours	
	Previous	Present	Previous	Present
Symington Mch. Corp., E. Main.....	7.00	8.00	3.00	4.00
Ritter Dental Mfg. Co., West Ave.....	7.30	7.00	5.30	5.00
Taylor Instrument Co., Ames St.....	7.30	7.00	5.30	5.00
Gleason Works, University Ave.....	7.00	7.00	5.40	5.40
Symington, Anderson Gun Plant, University Ave.	9.00	8.00	5.00	4.00
Amer. Woodwkg. Mch. Co., Lyell.....	7.00	7.00	5.00	4.50
Gen. Ry. Sig. Co. (office) West Ave.....	8.00	8.00	5.30	5.30
Stromberg-Carlson Tel. Mfg. Co., University Ave.	7.00	7.00	5.30	5.00
Todd Prot. Co., University Ave.....	7.25	7.25	5.00	5.00
Gen. Ry. Sign. Co., West Ave.....	7.00	7.30	5.15	5.45
Eastman Kodak Co. (1st section), Lake Ave.	7.30	7.10	5.25	4.55
Bausch & Lomb Op. Co., St. Paul.....	7.30	7.30	5.30	5.30
Eastman Kodak Co. (2nd section), Lake Ave.	7.30	7.10	5.30	5.15
Eastman Kodak Co. (3rd section), Lake Ave.	7.30	7.30	5.30	5.25
Eastman Kodak Co. (4th section), Lake Ave.	7.30	7.30	5.30	5.30
Eastman Kodak Co. to Charlotte.....	7.30	7.30	5.30	5.15
Rochester Folding Box Co., Charlotte.....	7.30	7.30	5.30	5.45
Retail stores	8.30	9.00	6.00	6.00
Clothing manufacturers.....	{ 7.15 } { 7.30 }	{ 7.30 }	{ 5.15 } { 5.30 }	{ 4.45 }

cars then filled the stoves whenever they deemed it necessary, more coal was consumed than was absolutely required.

The saving in coal mentioned was accomplished by locating coal boxes at certain points on the system and stationing a man at each location, assigned with the duty of seeing that sufficient coal is placed on fires in such cars as passed his station. This arrangement caused the fires to be coaled at regular intervals and by proper supervision the former waste was eliminated.

Another material result was attained in the saving of coal by following the recommendations of the committee in the matter of lighting cars. By minor changes in the wiring of our cars involving a very slight expense, we have succeeded in reducing by approximately 50 per cent the amount of electric cur-

Indiana Freight Rates Up 15 Per Cent

Commission Recognizes Superiority of Interurban Service—Shows Comparative Steam and Interurban Costs—Allows Emergency Rates

ANOTHER important decision just handed down by the Indiana Public Service Commission concerns charges for freight haulage. In its ruling of Jan. 18 the commission placed the interurbans of the State on an equality with the steam railroads as to freight rates. Although evidence at the hearings showed conclusively that the interurban cost of freight carrying is higher relatively than that of steam railroads, still the new rates will mean much to the traction systems. The increases amount to approximately a 15 to 20 per cent—and in some cases more—advance over former rates. The new rates also make for greater uniformity and less discrimination than did the old rates, established in 1908.

COMPARATIVE COSTS

A study of the compilations made by respondents regarding the terminal and road haul costs, the commission said, showed a surprising difference in operating cost as between interurban railways and steam railroads. In the commission's opinion, it is reasonably fair to assume that the average of less-than-carload revenue and cost is represented by third class. It, no doubt, varies on different interurban lines, but it is a sufficiently average approximation to warrant its use in rate computations.

A comparison of the third-class rates, as shown by the cost figures of respondents, with the third-class intrastate rates for steam railroads, shows that the operating cost of handling classified freight is less to interurban railways than to steam railroads for distances of less than 50 miles, and considerably greater

(Concluded from page 270)

rent used for lighting the cars. Although a noticeable change was made in the illumination of the cars, it cannot be claimed that our cars are unsafely lighted now, for no changes were made in the lighting of platforms or vestibules. At the same time, many pounds of coal will have been saved.

SAVING IS 100 TONS A DAY

The economies cited resulting from the reduction in the heating and lighting of cars, the staggering of the hours of industrial plants and the consequent increase of the load factor of our power stations, made a saving of approximately 17 per cent, or 100 tons of coal per day, and it is expected that a still better showing may be made in the future by additional economies of a similar nature.

We did not find it advisable to inaugurate the skip-stop or stagger stop on our lines because of local conditions, but the study conducted on this plan has resulted in the elimination of a number of non essential stops.

It is with pleasure that I state that our employees are co-operating in every way possible in the fuel conservation movement and that we are receiving the hearty support from the manufacturing industries, the city officials, our Chamber of Commerce and other civic bodies.

for distances above 50 miles, as shown by the accompanying table.

The interurban figures in this table represent the third-class rates justified by respondents' cost figures, if applied on an assumed operating ratio basis of 60 per cent. The figures in the last column represent the third-class rates authorized by the commission for steam carriers operating intrastate.

The hearings showed that the cost of equipment used by the interurbans in rendering freight service is very much greater per unit than is the cost of equipment of the steam roads. The record is also conclusive to the minds of the commission that the volume of business carried is very much less in the case of the interurban. Both of these matters demand consideration of greater investment in rendering service.

SUPERIORITY OF INTERURBAN SERVICE

Laying aside analysis of costs and return on investment, however, the commission stated that uppermost in its mind was the question of the justice of requiring the interurban railways to render at a lower rate the same service as that rendered by the steam railroads, if not better. The record indicated that the service of

	Interurban Railways	Steam Railroads
5 miles	\$0.072	\$0.125 per 100 pounds
10 miles .....	.0855	.13 per 100 pounds
20 miles .....	.112	.145 per 100 pounds
40 miles .....	.1646	.18 per 100 pounds
60 miles .....	.2172	.20 per 100 pounds
80 miles .....	.2699	.215 per 100 pounds
100 miles .....	.3309	.23 per 100 pounds

this character rendered is not only equal but superior to that of the steam railroads. The superiority of interurban freight service, the commission said, is quite generally recognized by shippers and commissions.

In conclusion the commission stated that it would not be able, in all probability, to justify the new rates for operation during normal times. It would, therefore, deal with the interurbans as it did in its recent order for the steam railroads, by putting into effect "war-time emergency rates," these to be limited to a period of one year from the date of order. Present abnormal operating costs are thought by the commission to be temporary.

The companies covered by the order are the Terre Haute, Indianapolis & Eastern Traction Company; Ohio Electric Railway; Union Traction Company of Indiana; Indianapolis & Cincinnati Traction Company; Chicago, South Bend & Northern Indiana Railway; Southern Michigan Railway; Fort Wayne & Northern Indiana Traction Company; Fort Wayne & Decatur Traction Company; Interstate Public Service Company; Louisville & Northern Railway & Lighting Company; Louisville & Southern Indiana Traction Company; Indiana Railways & Light Company, and Indianapolis & Louisville Traction Railway.

The Missouri Public Service Commission has issued a 163-page booklet, giving in the form of annotations, of sufficient thoroughness to serve as a digest, a complete statement of the points ruled upon in formal adjudications affecting the public service commission law of that State. At the close of the work appears a table of cases, arranged according to reports, volumes and pages, from which the case title of any decision shown can be readily obtained.

Public Control; Guaranteed Dividend; Higher Fare for Rehabilitation

Massachusetts Public Service Commission Recommends to Legislature Plan Whereby Stockholders, Car-Riders and Taxpayers Can Help to Restore Boston Elevated Railway—In Report on Operation Mr. Beeler Points Out Possible Operating Economies of \$1,200,000 a Year—Says System Needs \$2,700,000 for Rehabilitation Annually for Five Years

THE transportation system of the Boston Elevated Railway is not meeting the public needs, for the property has not been kept in good, modern operating condition, the net earnings are shrinking, the service is poor and the credit is gone. Such is the opinion expressed by the Massachusetts Public Service Commission in a special report on Feb. 2 to the State Legislature.*

In order to avoid a receivership, the commission recommends the adoption of public control and the use of public credit. It would, in short, have the stockholders place the property in the hands of trustees representing the public, and then have the municipalities served guarantee a 5 per cent dividend for two years and 5½ per cent thereafter. The sale of the Cambridge Subway to the Commonwealth would provide \$9,000,000 of new funds. The ordinary costs of service would be met by a 5-cent fare, deficits being covered by the municipal guarantee. An extra cent, however, could be charged by the trustees in order to meet the extraordinary costs of depreciation and rehabilitation. The commission is preparing a draft of the necessary legislation to accomplish these changes.

In the commission's opinion, such a plan has the advantage over any other that has been suggested for these reasons:

"It definitely establishes the status of investors. It creates public confidence in the administration of the company's affairs, and conditions favorable to the effecting of all feasible operating economies. It provides, at relatively low cost, a sure source of new capital. It takes care of depreciation. It makes possible, without inflation, whatever rehabilitation of the property is practicable under present conditions. It distributes the burden in the emergency fairly between car-riders and the whole community, and it makes it certain that any increase in fares which may be made will be used to insure better service at lower operating cost."

The commission's report is submitted in two parts—the first containing a statement of the essential facts, and the second discussion and recommendations. The first part covers the organization of the company, its finances and rate of return, and similar basic facts. Expenses and charges during the last two years, it is shown, have been increasing at a faster rate than earnings, and this tendency has been even more marked in the months since June 30, 1917. And during the coming year, it is said, the situation is likely to grow worse.

The first part also includes a summary of a report by John A. Beeler in regard to management and operation.

Shortly after the Public Service Commission was authorized on June 15, 1917, to continue the study of the Boston Elevated Railway, it engaged Mr. Beeler to make a special investigation. Mr. Beeler's examination began in July and ended in November. His report, constituting with exhibits a printed book of 279 pages, has now been made public in connection with the commission's own report.

MR. BEELER CRITICIZES EQUIPMENT AND TRACK

In summarizing Mr. Beeler's report the commission notes the following conclusions in regard to physical property: Mr. Beeler finds the rapid transit track in good condition, but the surface tracks are in poor shape. He says: "There are miles of rails that are crooked, broken, patched, repatched and welded, with joints that have been cupped, built up, hammered out and built up again. The general condition is, in fact, bad. 'Slow orders' are now in effect covering 34 miles of main line track."

Rolling stock is in about the same condition. In Mr. Beeler's opinion, "outside of the comparatively few stepless, center-door cars, which are modern, efficient and attractive in every respect, the equipment on the streets of Boston is either semi-obsolete or completely so." Most of the surface cars, judged by modern

*The present report of the Massachusetts Public Service Commission to the State Legislature originated in this way. As a result of the plea of the Boston Elevated Railway for financial relief, a special recess commission was organized by legislative resolution about the middle of 1916 to report to the Legislature on the needs of the property. The commission was composed of the Lieutenant-Governor of the State as chairman, the President of the Senate, the Speaker of the House, two members of the Senate, four members of the House, and the full boards of the Public Service Commission and the Boston Transit Commission.

After long and careful consideration of the company's brief, abstracted in the *ELECTRIC RAILWAY JOURNAL* of Sept. 30, 1916, the special commission on Feb. 1, 1917 (*E. R. J.* Feb. 10, 1917), recommended that the Legislature grant certain measures of relief which did not involve any direct burden on the public. These measures included abolition of the compensation tax and State acquisition of the Cambridge Subway. The commission noted certain objections to a fare increase and recommended that action be deferred. It suggested that the Public Service Commission investigate and report by February, 1918, upon the company's efficiency of management and that the Boston Transit Commission report at the same time upon the prospective rapid transit needs for the next decade.

The most important recommendation of the special commission—namely, State acquisition of the Cambridge Subway—was not adopted by the Legislature because of executive opposition. Certain lesser recommendations, tending to improve the financial condition of the company, were followed, and provision was made by special legislative act for further inquiry by the Public Service Commission along the lines above indicated. The report now made by this body should, therefore, be regarded as a continuation of and supplement to the report of the special commission in 1917.

The 1917 report of the special recess commission and the present report of the Public Service Commission deal with the electric railway situation only in Boston. These reports should not be confused with one under way for the whole State of Massachusetts. By legislative resolution a "street railway investigation commission" was created near the middle of 1917 to study the general problems of electric railway administration and financing and to report to the 1918 Legislature. The report of this body, just presented and briefly described in the News Section this week, indorses a service-at-cost plan suggested by Massachusetts investors. The approval of this plan, for State-wide use, by the Public Service Commission was noted in remarks of Chairman F. J. Macleod reported in the *ELECTRIC RAILWAY JOURNAL* of Feb. 2.

standards, are uneconomical and inefficient. Many of them are in need of paint and have not been kept clean or in good repair. The wooden cars on the rapid transit lines are "fast approaching the day when they should be retired and all-steel cars substituted." Service on these lines is frequently interrupted by equipment defects.

Power stations and apparatus on the whole are in excellent condition. Many of the other buildings, however, are not well suited for present railway use, some of them being inheritances from horse-car days. Carhouses and shops are widely scattered and often of unsatisfactory design. "A material reduction in the cost of maintenance could undoubtedly be made by new shops and consolidation of departments," if the company's financial condition warranted the expenditure.

Mr. Beeler's findings in regard to the physical condition of the Boston Elevated Railway, briefly indicated above, are said to be largely confirmed by the commission's own inspectors. Furthermore, it says that it does not understand the company to contest their general accuracy.

Mr. Beeler believes that a much larger sum should be appropriated each year for depreciation. For 1916 his report places this amount at \$2,247,995, or about 4.4 per cent of the book value of depreciable property. Compared with the expenditure actually made for depreciation purposes in that year, the additional amount which should have been spent or set aside is placed at \$1,508,073.

The company, the commission says, offers no specific objection to Mr. Beeler's estimate of depreciation requirements. In the commission's opinion, it is clear that depreciation has been neglected. Whether or not Mr. Beeler's estimate is correct, however, is a more difficult question. It is not wholly certain, the commission states, that past experience may be taken as a trustworthy guide for the future. The useful lives assumed by Mr. Beeler for the various classes of property are as follows:

Class	Life	
Track and line.....	18	years
Cars and car equipment.....	22	years
Power plant buildings and equipment.....	25	years
Shops, car houses and equipment.....	25	years
Elevated stations.....	50	years
Subway and tunnel equipment.....	25	years
Signals and telephones.....	20	years
Bridge betterments.....	50	years
Engineering and superintendence.....	24.6	years

According to the commission, these lives are similar to those usually employed in depreciation estimates and take into consideration obsolescence and inadequacy, as well as wear and tear. If cars are properly repaired they can be made to last almost indefinitely; but it is assumed that at the end of twenty-two years they will be obsolete in type and ripe for replacement. The same is true of power plants and shops. It is not easy to believe, however, that the new and modern cars which are

now being received will reach the end of their usefulness in twenty-two years, or that the new power station in South Boston will be ready for the scrap heap at the end of twenty-five years.

The general conclusion of the commission is that Mr. Beeler's estimate is generous. It represents a standard which a company might well maintain in times of prosperity, although the commission is inclined to believe than it would prove, in practice, somewhat higher than necessary to keep the property in reasonably modern condition. As long as war-time conditions prevail, it would be consistent with the public interest not to require so high a standard to be maintained. If the company were able to appropriate one-half as much for depreciation as Mr. Beeler estimates, it would be doing far more than it had ever done in the past.

The greater portion of Mr. Beeler's report deals with operating conditions. While he considers the existing management "virile and aggressive" and has high praise for the work of many departments, he believes that service can be improved and large savings effected in operating expenses if certain changes are made. Briefly stated, these are as follows:

1. *Changes from Surface Car to Rapid Transit Operation*

Certain subways and elevated structures are now used by surface cars. These are the Tremont and Boylston Street subways, the East Boston tunnel, and the elevated and viaduct from North Station to Lechmere Square. By an analysis of operating expense Mr. Beeler shows that it is much more costly to operate surface cars than rapid transit trains, and the accommodations are inferior. On the other hand, in the case of the rapid transit and surface subway lines the overhead charges, representing rentals actually paid and a return of 6 per cent on the investment, are enormous. Out of each \$1 of receipts 71.4 cents on the rapid transit lines and 79.6 cents on the surface subway lines are absorbed for that purpose, as compared with 14.7 cents on the street surface lines. The cost of subways and tunnels is so great that they ought to be utilized in the most efficient way. He therefore proposes to substitute trains for surface cars wherever feasible.

Under his plan, three-car trains would be operated from the Kenmore terminal of the Boyston Street subway to the North Station on a two and one-half minute headway during normal hours and a two-minute headway during rush hours. From the North Station the trains would go alternately to Lechmere Square over the viaduct lines, and to the South Station over the Atlantic Avenue line, giving five-minute service during normal hours and four-minute during rush hours on each. A simple terminal would be built at the Kenmore station, and passengers using the Beacon Street and Commonwealth Avenue surface lines would transfer at this point. Cars now entering the subway at the Public

Proposed Relief for Boston Elevated

Municipal guarantee of 5 per cent dividend for two years and 5½ per cent thereafter.

Control by board of trustees representing public.

\$9,000,000 of new money through purchase of Cambridge Subway by Commonwealth.

Deficit below ordinary costs of service under 5-cent fare to be met by municipal guarantee.

Six-cent fare chargeable at will of trustees, the extra cent going into a fund to meet extraordinary costs of providing for depreciation and rehabilitation.

Garden would loop back through Park Square and Church Street, passengers transferring to the subway trains. Cars now entering the subway at Pleasant Street would turn back at the Boylston Street station; and cars using the viaduct line, at Lechmere Square, where a terminal station would be constructed.

Mr. Beeler discusses the advantages and disadvantages of this plan at length and finds that the former greatly outweigh the latter. Perhaps the two most important advantages are that it would make possible a great improvement in the service on the Washington Street tunnel line and also go far to eliminate the confusion and congestion at Park Street. At the latter street the present congestion is caused chiefly by the cross-currents of passengers seeking cars at different berths. The number of seat miles operated through the subway would be increased by the proposed plan, and confusion would be avoided, since passengers could board the first train available instead of waiting for some particular car.

The plan contemplates raised platforms, flush with the car floor, at all stations in the Boylston Street and Tremont Street subways, and the introduction of the third rail. The company will soon have, with the rapid transit cars already ordered, sufficient equipment for the purpose, and the total expense, including the stations at Kenmore and Lechmere Square, is estimated by Mr. Beeler at about \$400,000.

2. Changes in Rapid Transit Operation

Service on the route between Sullivan Square and Forest Hills is now impaired by the fact that about every fourth train goes over the Atlantic Avenue line, instead of through the Washington Street tunnel. Crowds collect in the tunnel stations during this interval, the next train is overcrowded and delayed and the entire schedule slowed down. Trains move through the tunnel in bunches of three with loads badly distributed, while the Atlantic Avenue trains have excess capacity. By linking the Atlantic Avenue line with the Kenmore-Lechmere Square route, as above described, regular and dependable service could be given in the Washington Street tunnel.

3. Changes in Surface Car Operation

Mr. Beeler finds that from the point of view of the average car-rider, the most serious fault in the operation of surface cars in Boston is the extremely distorted headway on many lines. He recommends a rerouting of cars, based on the principles that main lines from outlying points should, in general, terminate at the nearest rapid transit station; that lines performing crosstown service should be maintained strictly as crosstown lines, and that lines crossing the congested business district should have the shortest possible routes. The rerouting recommended is set forth in detail for each district. Mr. Beeler believes that this plan would give more efficient service with less of the objectionable bunching of cars, and at the same time save a substantial amount of car mileage.

A further bad feature of present surface car operation is the amount of time consumed in lay-overs at the end of runs. Out of every hour eleven and one-half minutes are so used, or 19.2 per cent of the total active time. Mr. Beeler shows that this is much in excess of the percentage in other large cities. In his rerouting

plan the average lay-over is decreased from eleven and one-half minutes to eight and one-half minutes, resulting in an estimated saving of \$171,716 per year.

4. Power and Transportation Economies

The report states that power, although produced with great economy, is now wastefully used. Cars almost invariably are started with brakes only partially released, and, owing to the manner in which the rigging is adjusted, are operated most of the time with shoes touching the wheels. Motormen should be taught to use the controller properly and to throw off power and coast as often as possible. The use of a device for measuring efficiency in this direction, properly followed up, should result in a saving of about 20 per cent of the power consumed.

The cost of superintendence of transportation is very high. Mr. Beeler recommends in detail a new and less complex scheme of organization eliminating superfluous officials and cutting expenses about \$100,000 a year, at the same time bringing the management into closer touch with the men. It contemplates a reduction in the number of operating divisions, carhouses and rating stations, the merger of the inspection and instruction departments, and fewer starters and clerks.

Station employees in connection with prepayment areas cost the company \$400,000 in 1916. Mr. Beeler believes that many of these are unnecessary, and that, by a systematic reduction in the force, a saving of at least \$80,000 can be effected.

5. Further Suggestions

Other opportunities for economy are suggested by Mr. Beeler. Minor matters are wasteful methods in sanding track and removing snow, and the possible elimination of certain rapid transit stations which are little used. Of more importance is the method of issuing, collecting, inspecting and accounting for paper transfers. Improvements are recommended which Mr. Beeler believes will greatly reduce the present transfer abuse, thus conserving revenue. Suggestions are also made with respect to the methods of handling damage claims and in regard to the sale of unused real estate. In the case of the employees, the application of the principle of seniority to shop work is criticised, and the desirability of hearty co-operation between the men and the company is emphasized.

6. Summary of Estimated Savings

The estimated savings involved in his recommendations are recapitulated by Mr. Beeler as follows:

Equipment:		
Due to reduced mileage.....		\$91,551
Power:		
Due to reduced mileage.....	\$52,751	
Due to increased coasting.....	153,099	
		205,850
Conducting transportation:		
Superintendence	\$101,604	
Station expense	80,000	
Smoking cars	6,000	
Reduced mileage	456,546	
Reduced lay-overs	171,716	
		\$15,866
Injuries and damages:		
Due to reduced surface mileage.....		\$9,189
		\$1,202,456

It is stated that these savings would be largely due to the substitution of rapid transit for surface operating methods, and changes made possible thereby. Some of them could be made at once on the inauguration of the

new service; others, such as the savings incident to better use of power, could only be obtained gradually. No allowance was made for possible savings under Section 5 above.

REHABILITATION OUTLINED BY MR. BEELER

Mr. Beeler concludes his report by stating that examination of the physical property, especially rolling stock and track, furnishes convincing evidence that the system must pass through a thorough rehabilitation. In other words, renewals neglected in the past must be made and all abandoned property taken from the accounts. If such rehabilitation is not undertaken, he believes that the situation can only go from bad to worse.

Assuming that five years would be necessary for such rehabilitation, he summarizes the cost of the work as shown in the table below.

This estimate covers the approximate cost of placing roadbed and track in good average condition; of substituting modern, semi-convertible equipment for most of the old box cars and open cars now in use, and of improving shops and carhouses. The making good of impairment caused by discarded property would be an additional charge upon earnings.

Under Section 10 of Chapter 500 of the Acts of 1897, the amended legislative act under which the Boston Elevated Railway operates, the company was restricted from charging more than 5 cents, but it secured special protection against a reduction in the rate. This contract, the commission says, was not imposed upon the company against its will. Because of it, the company has not been required to pay the so-called "commutation" tax imposed upon all other electric railway companies or to carry school chil-

Track:	
29 miles per year for five years' at \$35,000.....	\$5,075,000
Cars:	
New passenger cars.....	5,000,000
175 motor equipments at \$5,000 for center-door trailer cars	875,000
Power:	
Installation of power-saving devices on cars.....	150,000
Rapid transit system for Boylston and Tremont Street subways, etc.	400,000
Shops, car houses and miscellaneous.....	2,000,000
Total rehabilitation cost.....	\$13,500,000
Cost per year for five-year period.....	\$2,700,000

dren for half fare. On the other hand, the company has frequently accepted the provisions of statutes providing for new subways or tunnels, although it had the legal right, under the terms of the contract, to refuse to do so.

The question which the Legislature asked the commission is this: Should Section 10 be repealed? It is a contract, the commission now replies, which cannot be annulled without the consent of the company, but it is assumed that such consent will be given if the contem-

plated action is likely to improve the financial position of the stockholders. If the contract is to be abrogated, however, such action should be taken because the public interest makes it necessary.

In the present case, the commission avers, the public need is clear. Physically and financially the transportation system operated by the Boston Elevated Railway is now below par. The duty of the Legislature, therefore, is to take such steps as are necessary to secure for the metropolitan district the transportation facilities and service which are essential to its welfare, but, in so doing, to impose as small a financial burden as possible upon the community.

The plan suggested to the Legislature by the commission provides for direct public control, but at the same time retains the advantages of private ownership. It leaves the situation such that at any time in the future the present status may be restored without difficulty, if such a course should then be deemed wise. The plan follows:

1. The company shall remain a private corporation, subject to the laws of the Commonwealth, and there shall be no transfer of the ownership of its property, except in the case of the Cambridge Subway.
2. The stockholders shall, in return for the guarantee of dividends of 5 per cent upon their shares for two years and 5½ per cent thereafter and as long as this guarantee continues, in effect transfer their voting power to a board of trustees representing the public.

3. This guarantee shall be made by the cities and towns served by the company through the medium of the Commonwealth, it being made in the name of the Commonwealth but with the provision that any payments thereunder shall be assessed upon the cities and towns in proportion to track mileage.

4. This guarantee shall continue indefinitely, until the Legislature shall otherwise order.

5. The board of trustees shall consist of five members, two of whom shall be residents of Boston appointed by the Mayor of the city, two of whom shall be residents of the other cities and towns served by the company appointed by the Governor, the fifth member, who shall be chairman, to be chosen by the other four members or, in the case of inability to agree, by the chief justice of the Supreme Judicial Court. No trustee, however, shall be an officer of the company.

6. The trustees shall receive from the company salaries to be fixed by the Legislature and shall be permitted to engage in other business not inconsistent with their official duties; they shall become the directors of the company; and their term of office shall be three years, all terms expiring at the same time, so that there may periodically be a complete change of control, if deemed desirable in the public interest.

7. The plan shall take effect upon the acceptance of the statute in which it is embodied by two-thirds in interest of the stockholders at a meeting duly called for the purpose; the present contract between the State and the company, as far as it relates to fares, shall cease upon, but not before, such acceptance; and upon and after such acceptance, the voting powers now exercised by the stockholders shall be exercised by the board of trustees appointed as above provided. If deemed advisable, the transfer of voting power to the trustees might be made by written instruments signed by the stockholders or by deeds of trust accompanied by a deposit of the shares in exchange for certificates of beneficial interest.

8. It is proposed that the company shall be subject, ex-

No Ordinary Relief Sufficient

Any of the ordinary methods of providing relief would be insufficient. If the company merely receives the right to charge a 6-cent fare, there is no likelihood, under present financial conditions, that any large amount of capital would be forthcoming, except at excessive cost, or that any plan of rehabilitation would be adopted which would really go to the root of the difficulty.

Unusual conditions demand unusual remedies. The commission believes that in the present emergency private credit and private enterprise are unequal to the task and that no fundamental improvement can be accomplished unless the whole community puts its shoulder to the wheel and pulls the Boston Elevated Railway out of the slough into which it is rapidly sinking, the burden being shared by stockholders, taxpayers and car-riders.

—MASSACHUSETTS PUBLIC SERVICE COMMISSION

cept as may otherwise be specifically provided, to the supervision of the Public Service Commission.

9. It is proposed that new capital shall be provided in the manner recommended by the special commission last year—namely, by the sale to the Commonwealth of the Cambridge Subway, payment to be made in installments as funds are needed.

Under this plan, the commission says, transfer of control would be effected without any more disturbance of the affairs of the company than would be caused by the election of a new board of directors. The trustees could, and probably would, retain the present officers. Neither the city nor the State would alone control. The purchase of the Cambridge Subway would provide, at low cost, a fund of about \$9,000,000 to be drawn upon for capital purposes, and would make unnecessary any issue or guarantee of new securities for a considerable period of time.

In the opinion of the commission the plan proposed is fair and advantageous to the stockholders, and it is fair to the public. As for an appraisal of the Boston Elevated and West End properties, the commission has not felt that such is necessary in order to deal justly and wisely with the existing situation. According to the commission, there have been faults in management, extravagances and instances of bad judgment, but the company has provided a great and costly system of transportation and has continually enlarged the service which a passenger may receive for a 5-cent fare. If it has neglected depreciation and failed to keep its property in the best of condition, this has been due very largely to the attempt to satisfy two conflicting interests. On the one hand has been constant pressure from the public for new and costly rapid transit facilities; on the other has been the desire to meet the reasonable expectations of stockholders.

In renewing the recommendation of the special commission last year for the acquisition of the Cambridge Subway by the Commonwealth, the Public Service Commission answers the objections of the Governor as follows:

"There is nothing novel in public ownership of subways and tunnels in the metropolitan district. The policy was first adopted in 1894 and has been consistently followed ever since, except in the case of the Cambridge Subway. Manifestly it is desirable that the whole connected group of subways and tunnels in Boston should be publicly owned, rather than that a minor portion should be retained in private hands.

"Local transportation systems bear a less direct relation to the war emergency than do the steam railroads, but it is clear that a breakdown in the Boston Elevated system, or even serious congestion of its service, would diminish the efficiency of a population whose energies are being devoted in no small measure to war purposes. Any expenditures necessary to keep this transportation system in good workable condition and to prevent intolerable overcrowding and delay are justifiable, under existing conditions, and, if the credit of the Commonwealth is used either directly or indirectly to meet such needs, it would be employed in the common defense."

POSSIBILITY OF OPERATING ECONOMIES

Even under the commission's plan the problem will still remain of taking the necessary steps to rehabilitate and improve the property and of meeting the cost of providing the service, including the guaranteed return.

Upon the present basis, the commission states, there seems no prospect that the company will earn 5 per cent upon its stock during the current year. Any deficiency can be met in but three ways, through operating economies, an increase in fares or taxation.

Conceding that the investigation was "both thoroughly and intelligently" made, that "if the improved methods and practices suggested by Mr. Beeler could be adopted they would undoubtedly result in a considerable saving," and that "most of his suggestions, in principle at least, are sound," the company expresses the opinion that "the possibility of instituting many of the savings is somewhat remote," chiefly because of local conditions, and that a much larger expenditure of capital would be involved than has been estimated. According to the commission, the local conditions to which the company refers have to do with the attitude of the public and of its own employees. In other words, the view is that the necessary co-operation of the men could only be secured after long effort and that the changes in operation recommended in the report might not prove acceptable to the public.

The commission believes that Mr. Beeler has made a most valuable report. It has been printed for free circulation, and after the public has become acquainted with it hearings will be held with a view to definite action. It will be necessary in some instances to enlist the good-will and co-operation of the employees, in others to make certain capital expenditures, and in still others to receive the approval and help of the public. The process will be gradual, and various modifications and adjustments may prove necessary, but to the commission the prospects seem good that ultimately substantial economies can be effected, and that some can be secured at once.

WHAT REHABILITATION IS DESIRABLE NOW?

While economies of operation and of management will help, it is clear to the commission that they will not wholly solve the problem, especially if depreciation is provided for and rehabilitation undertaken. Under the circumstances, any construction of new subways may be dismissed from immediate consideration, and also any plan for the provision of new shops. The work now in progress on the Dorchester tunnel and the Everett extension, however, should be pushed to completion as rapidly as possible, and any new construction work ought to be undertaken which is incidental to such of Mr. Beeler's plans for the better utilization of existing facilities as may finally be adopted. Furthermore, every effort should be made to restore the surface track to first-class condition and to begin the gradual substitution of modern rolling stock for present obsolete equipment. Provision should be made for future depreciation, perhaps not so large a provision as Mr. Beeler recommends, but a far better provision than has heretofore been made, and discarded property should gradually be eliminated from the accounts.

Additions and betterments may properly be paid for out of the proceeds from the sale of the Cambridge Subway or out of the amounts taken from earnings to offset discarded property. Replacements, however, ought to be charged at once against income. The act of last year permits a different procedure. Under this statute replacements, such as would be involved in any extensive substitution of new rolling stock for old, may

be capitalized temporarily and charged off gradually over a period of not more than fifteen years.

The trouble with this plan, to the commission's mind, is that it temporizes with the situation. It will be far better for the public and for the company, if it can be done, to meet the cost of replacements directly from earnings, avoid any inflation of capital, even though it be temporary, and secure at once the full financial advantage from change of conditions. Any increased burden upon earnings could be fully met only in two ways—through an increase in fares or through general taxation.

HIGHER UNIT FARE SIMPLEST AND EASIEST WAY OF RAISING FARES

The commission feels that a straight increase in the present unit charge is the simplest way of raising fares and the one of easiest application. Strong arguments can be advanced for the "zone system," and in certain situations, particularly where the amount of short-haul riding is large, these arguments may have controlling force, as the commission has recognized recently in the Holyoke fare case. In the present instance, however, the rapid transit lines and congestion are embarrassing factors, and the disadvantage of a straight increase is less marked because of the preponderance of long-haul riding. The Boston Elevated system, as Mr. Beeler points out, is distinctively a long-haul system, and the facilities which it affords are so necessary to most patrons that a 6-cent fare would probably result in less decrease in riding than is ordinarily the case.

COMMUNITIES SHOULD SHARE BURDEN

In the commission's opinion, however, the communities served should share the financial burdens of the situation, and it recommends the following plan, to be used in conjunction with public control:

1. If the revenue derived each year from a 5-cent charge on each passenger and other sources of income is insufficient, after allowing 16 per cent for maintenance and depreciation, to pay all other operating expenses, interest, rentals, taxes and other charges against income, and dividends at the guaranteed rate, the deficiency shall be met under the guarantee by the cities and towns served in proportion to track mileage.

2. If the revenue so derived is more than sufficient to pay such expenses and charges and dividends at the guaranteed rate, the excess shall be applied to the following purposes in the order given:

- To repay any amounts which may have been contributed by the cities and towns under the guarantee.
- To meet any additional requirements which would otherwise be met by an increase of 1 cent in the unit fare, as below provided.
- To meet the cost of extensions and improvements to the property, with the proviso, however, that if excess earnings should reach this point the board of trustees would be empowered, at its option, to reduce the unit fare below the 5-cent rate.

3. The board of trustees shall have power at any time, without recourse to the Public Service Commission, to increase the unit fare from 5 cents to 6 cents, the additional cent paid by each passenger to go into a special fund to be used only to make such further provision for depreciation and rehabilitation and for the gradual charging off of discarded property as the board of trustees, with the advice of the commission, shall determine to be necessary.

Under this plan, the 5-cent charge would be used to meet what might be termed the ordinary costs of service, the taxpayers making up any deficiency. The extraordinary costs of providing for depreciation and re-

habilitation would be met by the additional 1-cent charge. This makes it necessary to draw some line between maintenance and depreciation, and the standard of 16 per cent of gross receipts which has been adopted is about the amount which has been expended in the last two years for maintenance, exclusive of the sums set aside for depreciation.

Upon the basis of the number of revenue passengers in 1917, an additional cent charged throughout the year would yield \$3,810,173. It would furnish a large fund for rehabilitation purposes and would make it possible, if conditions were favorable, to complete the work within a reasonably short period of time. For every dollar spent in this way the public would benefit in better service and the company in lower operating cost.

Tramway Makes Good Fuel-Saving Record

EXTENSIVE generating economies and the co-operation of its employees, encouraged by a judicious bonus system, have resulted in a substantial saving in coal by the Denver (Col.) Tramway, as shown by a comparison of its records for the months of December, 1916 and 1917. In telling the public with posters and through the newspapers of the good showing made last month, the company directed attention to the current issue of *Tram-o-Grams*, in which it was explained how the saving was accomplished. The installation of new generating equipment has reduced the coal consumption during the last two years from 4½ lb. to 2½ lb. per

**Are you doing your bit
for the Fuel Admin-
istration? We are.**

**We saved—
3,000 TONS OF COAL
LAST MONTH!**

HOW?

Read the Jan. 12 issue of

Tram-O-Grams

**OUT
SATURDAY**



The Tramway power plant is saving 3,000 tons of coal per month through generating economies—

—yet used 6,218,875 kilowatt hours of electricity MORE last year for heating, lighting and operating Tramway cars than was used in 1915!

More heat, better lights, more power for more cars in 1917 with less coal consumed than in 1915.

At the request of the U. S. Fuel Administration we do not turn heat on in the cars until temperature goes down to 32° above zero, but at that point it goes on and stays on. In 1915 heat was frequently cut off during the rush hours.

In many Eastern cities coal shortage has forced the street railways to cut off heat entirely in the cars, in some only 75 or 85 per cent of the regular number of cars can be run.

See Tramograms on the cars today.

SAMPLES OF DENVER TRAMWAY FUEL-SAVING PUBLICITY

kilowatt-hour and decreased the amount of help necessary by reducing the number of boilers, although the length of working day was decreased and vacations for the men were also introduced. A system of bonuses by which the power-house employees share in the savings has induced the men to lend their efforts heartily in searching out all possible sources of economy, with the result that now the slogan is to "get it down to 2¼ lb. per kilowatt-hour." More scientific operation of the cars is also partly responsible for the reduced fuel record. The tramway company is said to be prepared to extend the bonus system to other than the power department as soon as the men make it worth while by increased efficiency.

Pittsburgh Railways Charging Higher Fares

New Fares Put on Trial Last Month Well Received by Public Despite Handicapped Service Due to Severe Winter—Two Rides for 11 Cents

ON JAN. 22, following the thirty days' notice required by the State law, the Pittsburgh Railways put into effect two new rates of fare, as follows:

If the passenger pays a cash fare, he pays 6 cents for a single ride. He may, however, buy two tickets for 11 cents, or a strip of ten tickets for 55 cents, making the charge for a ride 5½ cents. These tickets are sold by conductors and also at a number of stores in Pittsburgh and in the different cities and towns through which the lines of the Pittsburgh Railways extend. These stores are glad to sell these tickets at cost, in view of the trade which is brought to them by this convenience. In the advertisement which the company carried in the daily papers announcing the increased fare, the names of stores in which tickets would be sold were published.

AVOIDING DIFFICULTY IN MAKING CHANGE

A fear sometimes expressed in connection with the establishment of a six-cent fare is that conductors will be delayed in making change, especially at first, when passengers are not accustomed to tendering the exact fare. It is thought that the use of tickets will materially reduce this delay. Another plan was also adopted

besides that of supplying conductors with \$3 in 1-cent pieces when he starts on his run. This plan is to issue a 6-cent ticket combined with a 4-cent change coupon, so that the combination can be sold by the conductor for 10 cents. A reproduction of one of these "change coupons,"



TEN-CENT CHANGE COUPON

with the 6-cent ticket attached, is illustrated herewith. These change coupons, by themselves, can be used as cash in payment of fares. That is to say, they will be accepted by conductors at a value of 4 cents with 2 cents additional in payment of a fare. Or two 4-cent "change coupons" and 3 cents in cash will be accepted by conductors as payment for two single-fare tickets of the value of eleven cents. In other words, the object of the company in issuing the "change coupon" is to avoid delays when passengers are boarding cars and because of the prevalent scarcity of pennies.

Before the plan was inaugurated the company carried advertisements in the daily newspapers giving all information, and explaining that passengers could assist in eliminating loading delays by using tickets of the two-for-11-cent kind or by having the exact fare in 6 cents ready, or by accepting the 4-cent "change coupon," if they should proffer a dime for fare.

These regulations have proved much less formidable in practice than they sound. As a matter of fact, the public has bought the two-for-11-cent tickets in enor-

mous quantities, so that the 6 + 4 combination remains simply an emergency relief for the conductor. Studies are now being made to secure the proper kind of locked, non-jamming fare box. At present, fares are collected by hand.

HIGHER FARES A SUCCESS

The company has reason to feel highly gratified at the way its patrons have appreciated the justness of a higher rate of fare, particularly as the unusually severe winter,

<p>INSTRUCTIONS TO CITY AND SUBURBAN TRAINMEN.</p> <p>GENERAL ORDER No. 545.</p> <p>January 19th, 1918.</p> <p>TO CONDUCTORS AND ALL CONCERNED.</p> <p>ALL DIVISIONS OF THE PITTSBURGH RAILWAYS COMPANY:</p> <p>Commencing Tuesday, January 22d, 1918, the day fares are increased from 6 cents to 6 cents, or 6½ cents when tickets are used. Fare zones remain the same, except in the case of the Verona line, Route No. 708, which has been divided into two fare zones instead of one, the dividing line of fare point being Sandy Creek Station.</p> <p>Conductors will be supplied with a new type Series "A" ticket, put up in strips of ten (10) tickets, which conductors will sell to passengers at 55 cents per strip of ten (10). Conductors will also sell to passengers who make the request, two (2) of these tickets for eleven (11) cents.</p> <p>Conductors will also be supplied with single fare tickets, value 6 cents, to which is attached a "change-coupon" (value 4 cents), which the conductor will sell for 10 cents. These tickets will be put up in pads of 25 strips, each strip composed of five (5) tickets, each good for one six-cent fare, and five (5) "change-coupons" each redeemable for 4 cents.</p> <p>This "change-coupon" will also be accepted by the conductors as part payment for a fare, at its face value of 4 cents.</p> <p>CONDUCTORS ARE EXPECTED TO START THEIR DAY'S WORK WITH \$3.00 CHANGE IN PENNIES, and where possible are to make change in all cases. When impossible to make change, they will sell to passengers for 10 cents, a ticket and coupon as described above. The passengers will detach the ticket and deposit same in fare box (where fare boxes are used) and retain the change coupon for future use.</p>	<p>An additional supply of these 4-cent "change-coupons" will be furnished, which the conductor is permitted to use in making change in case he runs out of pennies, or at any time when passengers are willing to accept them. A sample of this coupon is shown on page 6.</p> <p>Conductors must watch carefully to see that passengers do not pay their fare with this 4-cent "change-coupon" and must be careful to secure 2 cents additional from passengers when it is tendered. The 4-cent coupon is not a reduced rate ticket and must be accepted merely as if it were 4 cents CASH. Conductors cannot accept this coupon and 7 cents for two fares, nor can they accept 11 cents cash for two fares. They can, however, sell two tickets for 11 cents, or two tickets for TWO 4-cent coupons and 3 cents cash, or for ONE 4-cent coupon and 7 cents cash, and then permit the two tickets to be dropped into the fare box for two fares, but according to the Schedule which has been filed with the Public Service Commission, the principle must always be followed that the fare is 6 cents when paid in cash, and 6½ cents when tickets are used.</p> <p>The conductors on other than fare box cars must cancel by punch marks, the tickets as soon as he receives them from the passengers.</p> <p>IT IS IMPERATIVE THAT CONDUCTORS KEEP THEMSELVES FAMILIAR WITH THESE NEW TYPES OF TICKETS.</p> <p>Where fare is paid in cash it must be 6 cents and 6 cents for every additional fare so paid, except only when tickets are used, which can be purchased as outlined above.</p> <p>Where the old style Series "A" cash tickets are presented, they will be accepted for fare upon payment of one cent additional. Conductors, however, will suggest to passengers who have these tickets, that they exchange them at the Main Office for the new type of ticket, or have them redeemed at face value.</p> <p>The Series "B" employees half-rate tickets will be acceptable for fare when one cent additional is tendered. Passengers presenting tickets of this type should be requested to have them redeemed at the Main Office and provide themselves with a new type ticket.</p> <p>Employees' Punch and Monthly Tickets will be accepted as heretofore.</p> <p>REDUCED RATE TICKETS.</p> <p>The McKeesport—33 for \$1.00 tickets, will not be accepted for fare. Passengers should be requested to have these tickets redeemed at the Main Office, either by</p>
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INSTRUCTIONS ISSUED TO TRAINMEN

car delivery delays, and the competition of munitions makers, has made it impossible to give the full service that the company desires. The very morning that the higher fare was inaugurated power was off the lines at various places for nearly three hours, yet the public accepted the situation with good humor. The passengers themselves gave short shrift to kickers.

An amusing instance of the effect of the new fare

<p>NOTICE</p> <p>THE NEW RATE of fare, 6c in cash or 5½c by ticket, will go into effect TUESDAY MORNING, JANUARY 22d.</p> <p>Tickets are now on sale by Conductors and at all stations of the Company.</p> <p>PLEASE PURCHASE TICKETS TO-DAY AND AVOID DELAY ON TUESDAY.</p> <p>PITTSBURGH RAILWAYS COMPANY</p>	<p>NOTICE</p> <p>CONDUCTORS WILL BE SUPPLIED WITH PENNIES TO MAKE CHANGE AS FAR AS POSSIBLE, BUT, WHEN UNABLE TO DO SO A 4c CHANGE-COUPON WILL BE USED. THIS COUPON WILL BE REDEEMED BY THE COMPANY OR ACCEPTED FOR FARE WITH 2c ADDITIONAL.</p> <p>PITTSBURGH RAILWAYS COMPANY</p>
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POSTERS ANNOUNCING THE NEW RATE

on a flustered conductor is told. A passenger, wishing to make matters easy for this conductor, tendered a quarter and a penny so that he could get exact change. The conductor, confronted by this novel situation, insisted on returning the penny and making 19 cents change out of the quarter.

American Association News

War Board Met at Washington Headquarters on Feb. 1

Manila and Toledo Sections Held Big General Meetings with Music as a Feature

War Board Meeting of Feb. 1

THE American Electric Railway War Board met at Washington, D. C., on Feb. 1 and spent the day in routine business. All of the members of the Board were present and also President J. J. Stanley and Secretary E. B. Burritt of the American Association.

The organization of the traffic bureau and its proposed plans for utilizing the electric railway lines in the handling of government freight and passenger traffic, were thoroughly considered. Careful attention was also given to a request from the War Department of the government for recommendations of men for certain specific war duties.

Further details of the meeting will be given in a later issue of this paper. The Board will meet again on Friday, Feb. 15.

J. M. Bury Elected President of Manila Section

AT THE meeting of company section No. 5, held on Dec. 4, a number of business items were attended to, the principal one being the election of officers for the coming year. The result was as follows: President, J. M. Bury; vice-president, M. E. Chaves; secretary, J. G. Hess, Jr.; treasurer, B. Solano; director for four years, F. Santiago.

The preceding meeting, held on Nov. 20, was the occasion of the presentation of a very practical paper by B. H. Blaisdell, chief engineer power plant, on the subject "A Kilowatt-Hour and the Coal Required to Produce It." An abstract of this paper will appear in a later issue of the JOURNAL. As a compliment to J. H. Pardee, president J. G. White Management Corporation, and J. P. Ripley, railway engineer of the same company, who were present on a visit from the United States, the meeting was made an open one. Mr. Blaisdell's paper was extensively discussed and the gist of the discussion will be incorporated with the abstract of the paper.

At the November meeting, Eugene Wagor, traffic inspector, who won "honorable mention" in the 1917 competition for the best paper presented before a company section, was awarded the sum of 50 pesetos by C. Nesbitt Duffy, vice-president of the company, in recognition of the honor which the section received through Mr. Wagor by virtue of this award. It will be remembered that Mr. Duffy had promised 100 pesetos to any member of the section who should receive the medal. While no gift had been promised to the winner of "honorable mention," Mr. Duffy felt that Mr. Wagor had come so

close to winning the medal that he had earned this recognition.

In commenting upon the award to Mr. Wagor, Mr. Pardee called the attention of the employees to the fact that the motormen and conductors are the company's salesmen. The motormen present the goods for sale and the conductors collect from the customers before the latter get their goods. When the customers are satisfied they are glad to trade with the company again. If not, while they may have to trade with the company, yet they dislike to do so, and the relations between merchant and customer are not satisfactory.

After Mr. Pardee's remarks the meeting was entertained by selections from three different orchestras composed respectively of employees from the transportation, power plant, and shop and carhouses departments. The last-named orchestra performed on native bamboo instruments.

Safety Rally at Toledo

ON JAN. 23, in the Auditorium Theater, Toledo, Ohio, Marcus A. Dow, general safety agent of the New York Central Lines, spoke at a joint safety rally of the employees of the New York Central Lines, the Willys-Overland Company and the Toledo Railways & Light Company on the subject "Accident Prevention a Patriotic Duty." In connection with his talk on accident prevention Mr. Dow showed his safety film entitled "The Rule of Reason."

Mr. Dow summarizes the present safety situation in these words: "The prevention of accidents is important at all times both from a humanitarian and economic standpoint. To-day, however, with our country at war, it is of greater importance than ever that every consistent effort be made to conserve the lives of industrial workers and to prevent disabling injuries, because the killing and maiming of this vast army yearly is a serious drain on the man-power of the nation at a time when every available man is needed for the work that is to be done."

At the meeting the Overland Band played, and Hon. Cornell Schreiber, Mayor of Toledo, made a short address. Frank R. Coates, president of the Toledo Railways & Light Company, presided at the meeting.

Electric Railway as Usual a Public Benefactor

THE records of fifty years in the United States Weather Bureau show previously no such conditions as have existed recently in Chicago. The manner in which the street railway company kept open the main highways for vehicle movement of all kinds inspired many letters of appreciation and friendly editorial comment in the daily papers. Out of some 2000 miles of streets in the city, cars use one-fourth of the total. The fact that for days at a time no thoroughfares were open except those furnished with car lines brought thousands of vehicles onto the tracks. Snow was piled from 4 to 10 ft. high on each side of the moving cars and this left no roadway for other vehicles. The result was prolonged congestion and reduced car movement, the speed of course being reduced to that of the slowest vehicle.

LETTERS TO THE EDITOR

Publicity Always the Best Policy

SOUTHERN PUBLIC UTILITIES COMPANY

CHARLOTTE, N. C., Jan. 29, 1918.

TO THE EDITORS:

In the issue of Saturday, Oct. 14, 1916, the *ELECTRIC RAILWAY JOURNAL* carried a cartoon, the title of which was "The only time not to start a publicity campaign." This cartoon showed a street car carrying only the motorman and conductor, the center of attacks from the multitude along the street. Brick bats labeled "abuse," "demand," "lower fares," "complaint" and other things were being hurled at the car.

This cartoon and the accompanying subject matter attracted my attention at the time, and since then the lesson carried has been the guiding star in the policy of this company (Southern Public Utilities Company) in the matter of publicity.

Last week at Greensboro, N. C., I saw the value of the lesson more clearly than I had ever thought to see it. At that time and place representatives of the leading electric railways of North Carolina gathered for a conference on the matter of increased revenue. That additional revenue was a necessity was agreed upon before the conference, but the manner of bringing this condition of affairs into existence was the question to which these gentlemen at the Greensboro meeting addressed themselves.

One of the first things that the chairman of the conference [Robert Lee Lindsay, vice-president and general manager of the Durham (N. C.) Traction Company] said was that a comprehensive campaign of educational publicity was desirable. He commented upon the results of the fixed publicity policy of this company and that of the campaign recently waged in Greensboro by the North Carolina Public Service Company, under the direction of President Charles B. Hole, which brought about a ruling by the City Commissioners allowing that company to withdraw special rates and special tickets. He urged the inauguration of a campaign of education which would show to the people at large the necessity of being allowed to increase revenue.

This was thought to be a step in the right direction, but the representative of another company expressed the opinion that in the meantime his company and others would be losing money, that immediate relief is what is now desired.

Then the cartoon and accompanying subject matter, of which I spoke above, came again into my mind, and I realized more forcefully than ever before the accuracy of the position taken by the *ELECTRIC RAILWAY JOURNAL* nearly a year and a half ago.

Then again, as if in response to the demand of the occasion, the *ELECTRIC RAILWAY JOURNAL* in its issue of Jan. 19 of this year, carried a two-page signed statement, editorial, I suppose it might be called, along the same line. In this statement appeared this pertinent paragraph:

The ability of the electric railway industry as a whole to do a profitable business depends absolutely on the state of the public mind toward that industry.

It seems to me that this paragraph was written especially and particularly for those electric railways which have never undertaken the education of the public concerning difficulties under which they operate, the matter of increased cost of material, labor, and all other costs of operation in which the public will show a decided interest when given an opportunity.

This leads me to return to the suggestion of a central publicity bureau of the American Electric Railway Association for the assistance of railways in just this sort of situation. I believe great service can be rendered the individual railway by the association in furnishing data for use in advertising matter, and still am of the opinion that the railways do not make use of the service now offered by the association. What is needed, to my mind, is the education of the electric railway companies to the necessity and advisability of educating the public *before there is the necessity for decisive action*, such as appears now to be the case with electric railways in North Carolina.

By educating the public I do not mean begging the question, by pleading with the people to give the railways added revenue, or a fair deal in legislation, or many similar matters, but as shown in your signed statement (pink sheet, Jan. 19), "through its passion for fair play, justice and good sportsmanship."

And in conclusion I want to violate the proprieties a bit by suggesting that electric railway management officials over the United States would do exceedingly well to not only subscribe for the *ELECTRIC RAILWAY JOURNAL*, but to read it and study it carefully, and put into operation many of its most excellent suggestions *before there is a necessity* for such action as is indicated. I deem it well worth the while of the highest paid executive in the country to give careful attention to these suggestions. If acted upon at the proper time they will in many cases eliminate the necessity of drastic action, and often unsuccessful results therefrom.

The publicity campaign for the education of the people as to the exact situation confronting electric railways in North Carolina has already been inaugurated, and if handled in the proper way the results will be all that could be hoped for.

But the wrong time to start a publicity campaign, as so graphically shown in your cartoon, is when the public is throwing bricks through your windows.

LEAKE CARRAWAY,
Director of Publicity.

Shall We Go Back to Cradle Suspension?

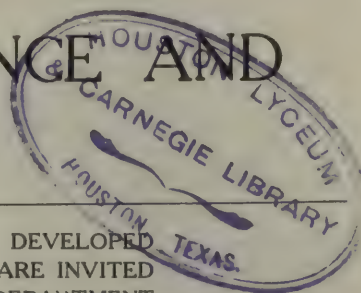
NEW YORK, Feb. 4, 1918.

TO THE EDITORS:

I have read with interest the article on "Experience with Interurban Car Axles" by A. B. Metcalfe of the Empire State Railroad, Syracuse. His road is not the only one which is suffering from axle failures of the kind which he describes. The cause of these troubles, which brings other ailments in their trains, is the faulty design of mounting the dead end of the motor on the axle without any vertical cushion or side play. The result is that the axle is constantly subject to severe hammer blows. The Empire State Railroad is not the only corporation suffering from these defects. This trouble will continue until a more rational method of motor suspension is general.

JOHN DEE.

CONSTRUCTION, MAINTENANCE AND EQUIPMENT



ENGINEERS, MASTER MECHANICS AND OTHERS WHO HAVE DEVELOPED ECONOMICAL PRACTICES, OR WHO HAVE WORTH-WHILE IDEAS ARE INVITED TO TELL READERS OF THE JOURNAL ABOUT THEM IN THIS DEPARTMENT

Auto-Tower Truck with Engine-Raised Tower

Three-Section Tower with Men in Place Raised in Ten to Twenty Seconds—Tower Can Be Raised and Lowered While Truck Is in Motion

BY S. L. FOSTER

Chief Electrician United Railroads of San Francisco

THE United Railroads of San Francisco has recently developed and put into successful service for rapid and efficient overhead trolley line work an interesting type of auto-tower that is believed to be unique in its labor-saving method of tower hoisting.

The vehicle consists of a three-section tower mounted on a 2-ton Pierce-Arrow worm-drive chassis, the tower being raised and lowered by the standard hydraulic hoist of the Pierce-Arrow dump body. This form of ram cylinder hoist for each foot of lift requires two feet of rope and lifts the front end of the dump body two feet. The steel cables from the ram cylinder are wrapped around the hoisting drum of the standard Trenton tower. In its $3\frac{1}{2}$ ft. of rise the hoist unwinds from the drum 7 ft. of its cable and at the same time winds onto the drum 7 ft. of the cable used to hoist the tower, thus raising the tower 7 ft. If a lesser or a greater rise of the tower is desired for this $3\frac{1}{2}$ ft. of ram-piston travel, the relation between the diameter of the part of the drum on which the hoist cable is wound and the diameter of the part on which the tower cable is wound can be readily altered to secure any reasonable result.

In operating, oil is forced under the piston of the ram cylinder by a pump actuated by a dog clutch. This is connected by gearing with the main automobile engine shaft and controlled by a three-way valve. The first of the accompanying photographs shows the chauffeur with his right hand on the handle governing this valve located at the side of his seat just behind the Stewart warning horn. The tower can be raised, lowered or held at any height without moving from the driving position. Further, it can be raised on the way to the work and lowered while en route departing—an impossibility with the hand-operated crank on the horse-drawn rig.

No oil reservoir is needed, as the oil pumped under the piston is drawn from above the piston, and, in lowering the tower, the oil is forced back into the original cylinder through a by-pass pipe. An automatic safety relief valve in the piston is opened when the piston of the ram cylinder approaches the head of the cylinder, thus preventing any excessive lift of the tower from inattention of the chauffeur.

There are many advantages in the three-section tower. It is stronger than the two-section type, as the light top section is reinforced by the intermediate section $2\frac{1}{2}$ ft. further up in the later three-section type than in the older two-section one, and the former is thus more resistant to strains from pulling out long lengths of trolley wire. Also, in this later type, the platform when down is 12 in. lower than with the two-section tower and when raised is 16 in. higher. These differences can be readily varied to suit the taste, as already explained. The construction of the three-section tower lowers the center of gravity, already lowered by the small-wheeled, heavy auto chassis, reduces the danger of overturning on rounding curves, permits higher speed and enables the workmen to reach the 22 ft. high trolley wires at steam railroad crossings and the tops of side poles readily.

There are also many advantages of the motor-driven hoist for the tower as compared with the old crank and ratchet appliances. It saves time and the physical energy of the men, raises the tower in from one-sixth to one-third the time, lowers it three times as rapidly and eliminates all danger of the crank handle slipping from the workman's grasp and breaking his arm or striking his head, as has happened in the past on the manually operated hoists of the horse-drawn wagons.



AUTO-TOWER TRUCK WITH TOWER RAISED

The men formerly engaged in tiring themselves out on the crank raising the tower and then leisurely climbing to the raised platform, now mount the platform when down and are elevated to their work without effort. Thus time is saved and the men are more alert and energetic in the work that counts. The loaded three-section tower can be raised by the hydraulic hoist in from ten to twenty seconds, whereas by hand the empty two-section tower ordinarily consumed from sixty to

seventy-five seconds. The hand crank means of hoisting is always available if the power mechanism fails.

Attention is directed to San Francisco's tropical winter background, seen in the illustration. The following features should also be noted: The portable forge at the rear of the vehicle in one picture and the suspended solder pot in the other; the "Desert Bag," in which the men carry their supply of fresh, cool drinking water; under the "Desert Bag" the long box, with its hinged side for ready emptying of scrap material; the box in the rear for the men's waterproof coats; the row of hooks for hand lines, tie wires, slings, etc., under the "Auxiliary Fire Apparatus" sign; the shielded siren under the license plate; the "spotlight" on the dash for night work on poles; the "J. M." fire extinguisher under the spotlight; the double hooks for two extension ladders along the side of the machine; the use of the ram cylinder of the hoist as a standard on which to install radiating, superimposed metal arms equipped with hooks of trolley wire for supporting and at the same time keeping separate and readily accessible various kinds of material like cap and cone bodies, curve hangers, pole bands, eyebolts, washers, links for use on porcelain insulators, linemen's "spurs," wood-strain insulators, frogs, 35-deg. angles, etc.; the double material and tool bins back of the tower and the charcoal bin under the floor; the tool boxes on the platform of the tower; the plentiful array of hooks all around on the lower tower section on which to hang blocks, bolt cutters, coils of trolley wire, strand, feed and cable wires, coats, etc. There is also a drawhead in the rear for ready attaching of tongues of formerly horse-drawn vehicles such as ornament hoist, derrick or trolley gig.

It should be stated that the departure from parallelism between the cables going from the sheaves at the top of the piston rod of the ram cylinder and the piston rod, as appearing in one of the photographs, was found to cause chattering of the piston rod when nearly out. This has been remedied since taking the photographs by installing two idler sheaves at the top of the ram



TRUCK WITH TOWER IN RUNNING POSITION

cylinder to hold these cables to true parallelism with the piston rod.

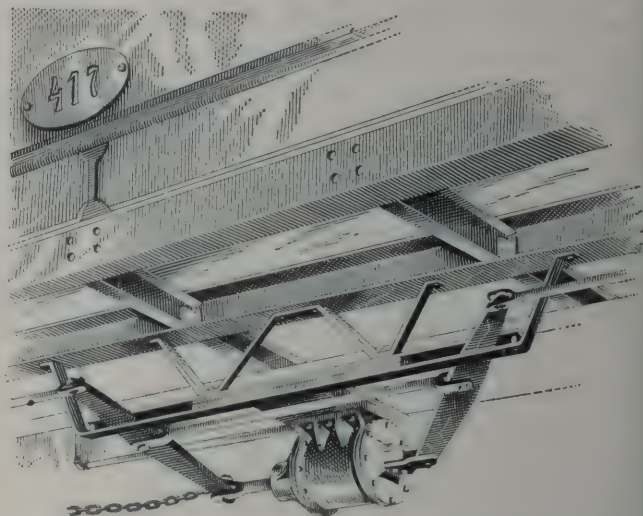
The standard Pierce-Arrow 2-ton chassis wooden protecting hood for the chauffeur was replaced by a two-bow top for use in our rainy winters and entire removal in our rainless summers, so that the chauffeur could the more readily hear the verbal or whistled orders from the men aloft. The swinging leaf of the tower is worked projecting over the rear of the vehicle for the same reason that the hood was removed, namely, to fa-

Insuring the Action of Brakes on Double-Truck Cars

By F. J. FOOTE

Master Mechanic, Ohio Electric Railway, Columbus, Ohio

THE failure of one main brake rod on double-truck equipment when the loss of power prevents reversing the motors is likely to result in a serious accident, especially when it occurs on a down grade. To insure against this condition, we have installed on most of the cars of the Ohio Electric Railway a simple device, the



STOPS FOR BRAKE LEVERS IN CASE ONE MAIN BRAKE ROD FAILS

application of which can be seen from the accompanying sketch. Two 3-in. steel straps, $\frac{7}{8}$ in. thick, were bolted together with one or more similar straps of shorter length between them, and fastened to the car sills set on a level with the axis of the air cylinder. This provides slots in which the cylinder levers move during all normal braking, and in case a main brake rod fails, the motion of the lever it is connected to is definitely limited so that force can still be exerted on the other brake rod. In other words, it supplies a point of support for the affected cylinder lever to replace the reaction that would be transmitted from the brakeshoes through the disabled rod.

Such a device for this purpose is easy of application and inexpensive. The bracing can be done in different ways, using any suitable material which is on hand, the only requirement being that it be strong enough to withstand the severe strain.

cilitate verbal communication between men aloft and the chauffeur and also because in twenty-seven years of tower-wagon experience there has never yet been a case of injury to the driver by anything falling on him.

Two improvements possible on the auto tower as at present equipped are the application of a self-starter and the use of an as yet undeveloped device for heating a pot of solder. The device sought should be lighter and simpler than the heavy charcoal forge, but equally as satisfactory and as rapid in results in our windy climate. Gasoline consuming appliances have so far proved unreliable here, compressed gas consuming appliances unequal to the task and electrical appliances undeveloped.

Car Axles, Their Design, Manufacture and Service

PART II—ANALYSIS SHOWS THE DESIRABILITY OF ELIMINATING ABRUPT CHANGES IN SECTION

BY NORMAN LITCHFIELD

IN THE issue of this paper for Feb. 2 we discussed the method of calculating the maximum stresses in a car axle, illustrating the theory by applying it to one of the A. E. R. E. A. standard axles. Having thus determined the magnitude of the stresses the next point to be settled is whether, with a given steel, there remains a sufficient safety factor to give a safe axle, by that term meaning one which will be free from failure during its life as determined by the wear of the journal.

It is evident that we cannot state absolutely that the stress as figured represents actually the stress in the axle under the conditions in which it operates. We can, however, measure each axle by the method and determine by experience and analysis what stresses when so calculated have produced axles that have operated satisfactorily and what stresses have existed in axles that have failed.

LESSONS OF THE MASTER CAR BUILDERS' REPORT

The M. C. B. committee in the report referred to earlier reported as follows:

"Breakage may occur as the result of poor material, bad design in respect to shape, the spreading of an initial crack, or from repeated applied stresses above a safe limit. In Wöhler's celebrated series of experiments upon the effect of repeated stresses in small bars, he found that, where the strains alternated between tension and compression, the outer fiber stresses might be safely taken as 17,000 lb. per square inch for iron, and 23,000 lb. per square inch for steel, without limiting the life of the bar. But if the stresses exceeded these limits, fracture would always occur if the number of repetitions of stress were sufficient.

"Again, in large bars, such as car axles, where the extreme or outer fibers are a considerable distance from the neutral axis, and where the material is often far from homogeneous throughout, it is reasonable to suppose that strains are not transmitted symmetrically in all its parts, and some of the fibers may bear a larger proportion of the total stress than would occur in an even distribution. In this way the elastic limit may be locally exceeded with a very moderate total stress only. Professor Bauschinger determined what he called the 'natural elastic limits' of a bar in tension and compression. These limits he defined to be the limiting load to which a bar of the same material can be strained repeatedly in tension and compression without breaking, when the load is repeated sufficiently often, as determined by Wöhler. The 'natural elastic limit' is considerably below the elastic limit as ordinarily determined. The explanation of this fact as given is that the welding, forging or other manufacturing process to which a bar has been subjected temporarily raises its elastic limit, which is again lowered to its true value under the influence of alternating stresses.

"There seems to be no evidence to show that, when the fiber stresses are kept below the natural elastic limit, any apparent change in the structure will occur

before the axle is condemned by reason of being worn out at the journals.

"Taking the fiber stress calculated (as explained in the M. C. B. report) it was found that a large number of axles of one design had broken where the fiber stress was 28,000 lb. per square inch, these axles having been in service from four to nine years. Where the fiber stress was 23,000 lb. or less, the records show that axles have been practically free from failure by breaking."

The committee concludes that "if a fiber stress of 22,000 lb. per square inch is taken for the portion of the axle between the wheels, and the proper material is provided, a safe design will be the result without much surplus material."

Since the day of this very remarkable and original report the development of the automobile and the aeroplane, of ordnance, projectiles and armor plate, has caused tremendous strides to be taken in the manufac-

ture of steel and in the knowledge of the qualities best suited for different service. In the main, however, the basic facts given in that report remain true, namely, that metal in a given condition remains in the same molecular condition indefinitely, the so-called "crystallization" of steel being non-existent; and that the life of the axle under repeated alternating stresses increases enormously as the maximum stress

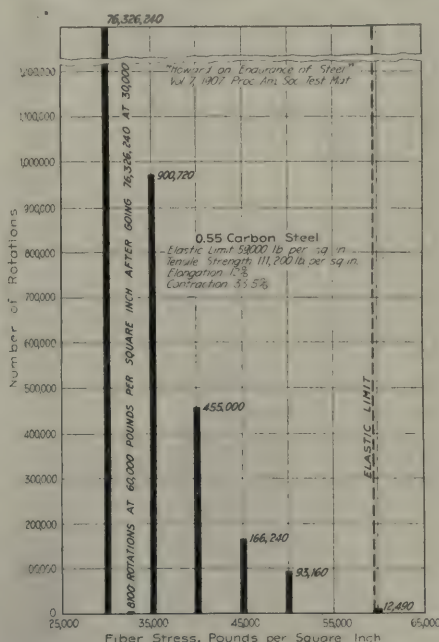


FIG. 3.—DIAGRAM SHOWING PROGRESSIVE GAIN IN ENDURANCE OF STEEL AS LOADS ARE REDUCED

is reduced in proportion to the elastic limit of the material used. The latter fact is well illustrated in a paper presented by Howard before the American Society for Testing Materials on "Endurance of Steel," and printed in Vol. 7, 1907, of the *Proceedings* of that society. The graph given in Fig. 3, reproduced from that article, shows the progressive gain in endurance of steel under alternating (rotating) stresses as the loads are reduced, showing that with a load stressing the specimen to its elastic limit (60,000 lb. per square inch) the steel failed after 12,490 revolutions. When the load was reduced so as to give only 30,000 lb. per square inch stress (50 per cent of the elastic limit) the steel stood up for 76,326,240 revolutions without failure. The load on the same specimen was then increased to 60,000 lb. per square inch and the steel failed after 8100 revolutions.

Assuming, then, uniformity in the steel and proper design of axle, it is generally agreed that the life of the axle will increase as the ratio between the maximum stress and the elastic limit is increased. It then remains to determine how low a figure must be selected for the maximum stress. In the M. C. B. report this

was given as 22,000 lb. per square inch for the freight-car axle under consideration. It will be remembered that in the committee's calculation an increase in load equal to 26 per cent of the weight on the journals was included to allow for vertical oscillation. Twenty-two thousand pounds per square inch stress thus calculated is equivalent to 17,500 lb. per square inch without making allowance for vertical oscillation. For passenger-car axles it is considered good practice on steam roads to make the limit 15,000 lb. per square inch. This, it will be noted, is on the two assumptions of center of



FIG. 4—FLUID ANALOGY OF ABRUPT CHANGE IN FIBER STRESS IN AXLE

gravity 6 ft. above the rail and centrifugal force just sufficient to overturn the car (40 per cent of the weight). For electric-car service, with its sharp curves, high acceleration and braking rates, gear vibration, etc., the lower center of gravity as found in Fig. 1 (page 235, Feb. 2 issue) should be considered together with force required to overturn the car.

A number of axles in electric service in which the stress ran between 22,000 and 23,000 lb. per square inch failed after about 250,000 miles, while another lot of same character of steel, in which the stress ran about 18,000 lb. per square inch, gave satisfactory service throughout their life.

STRESS INTENSITY SHOULD NOT CHANGE ABRUPTLY

Referring to Fig. 2 again (page 236, Feb. 2 issue), it is seen that the maximum stress in the electric railway axle shown is 17,654 lb. per square inch, or something less than that in the axles above cited which gave good service. A closer study, however, shows that the design is not a good one, on account of the abrupt changes in the intensity of the stress, particularly at the point of maximum stress, where it is 11,604 lb. per

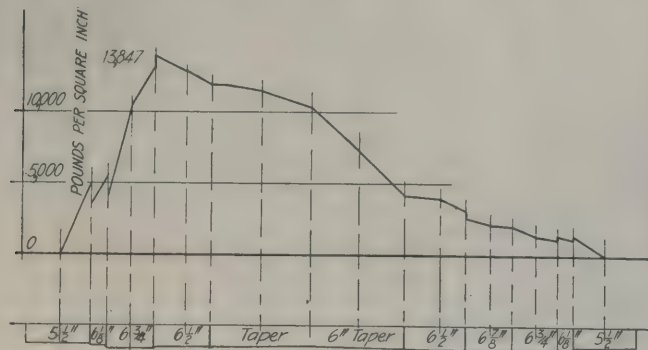


FIG. 5—STRESS DIAGRAM DRAWN FOR AXLE MODIFIED FROM A. E. R. E. A. DESIGN

square inch in the wheel seat and 17,654 lb. per square inch immediately alongside it at the motor bearing.

It may be asked why such a change in stress is undesirable. A good method which has been used to make this clear is the use of the analogy of the flow of water through an abruptly restricted section of pipe, as shown in Fig. 4. In the large pipe the velocity at A is V , which in the small pipe becomes V_1 , greater in inverse proportion to the squares of the diameters of

The Use of Ball Bearings on Electric Railways

Series of Tests Conducted on Berlin Street Railways Demonstrates Superiority of Ball Bearings Over Plain Bearings

THE Berlin street railways recently carried out a series of tests on cars equipped with ball bearings, as described in a late issue of *Electrotechnik und Maschinenbau*. These tests were made under conditions involving the various phases of street railway operation ranging from very low speed in heavy traffic to high-speed non-stop runs of several blocks between stops. The results of six round trips with four cars—one of which had plain bearings and the other three ball bearings—showed an average saving in energy consumed by the cars with ball bearings of 8 per cent over that consumed by the car with plain bearings.

The tests were continued during the night with the same car with plain bearings and two of the cars with ball bearings. Because of the absence of traffic and the elimination of some of the stopping at switches the consumption of energy during the six round trips was more evenly distributed and also somewhat less than during the previous tests. The results of the six round trips was an average saving, by the cars with ball bearings, of 8.8 per cent of the current consumed by the car with plain bearings. The tests continued with trailers showed an average saving of 7.6 per cent with ball bearings.

Repeated tests showed that the values for each of the cars fluctuated according to the motorman, the roadbed and the weather, and probably also because of different conditions in the various bearings. One of the peculiar results of the tests was the discovery that it took a motorman from a quarter of an hour to half an hour

the pipes. At C it is evident that there is a violent local action, due to the rapid change in velocity at that point. A small fillet does not make the transition gradual enough to prevent the likelihood of localization of stress at this point.

A modified design is shown in Fig. 5, which would require boring out the motor brasses to the amount shown, and enlarging the journals. The slight reduction in the wheel and gear seats is not sufficient to cause any loss in the holding power of these parts on the axle. The stress diagram given in Fig. 5, in comparison with that in Fig. 2, shows how much more evenly the stress is distributed than in the standard axle.

Such a design is desirable, for no improvement in material or even reduction in maximum stress will make up for poor design. Thus, where the conditions are such that it is impossible to increase the minimum section so as to bring the stress within the limits of good practice, special care should be taken in the design to eliminate sudden and violent changes of stress as far as possible, as well as to use extra-high-grade material.

The use of keyways is also very detrimental for a similar reason, and as experience has clearly shown in rigid service that they are not necessary in order to maintain tight fits of wheels and gears, they should be eliminated.

BALL-BEARING-EQUIPPED CAR AFTER EIGHT HOURS' CONTINUOUS SERVICE. BEARING TEMPERATURE 35 DEG. C.

	Immediately on Arrival of Car	After Five Minutes	After Ten Minutes	After Thirty Minutes	After Two Hours	After Two Days
Force required to move car, pounds	159.	154.	150.	151.	152.	150.
Friction resistance, pounds per ton..	11.7	11.4	11.1	11.15	11.2	11.1

PLAIN-BEARING-EQUIPPED CAR AFTER SIX HOURS' CONTINUOUS SERVICE. BEARING TEMPERATURE 43 DEG. C.

	Immediately on Arrival of Car	After Five Minutes	After Ten Minutes	After Thirty Minutes	After Two Hours	After Two Days
Force required to move car, pounds	408.	463.	485.	496.	489.	494.
Friction resistance, pounds per ton..	29.8	33.7	35.3	36.1	35.6	36.0

to become accustomed to the easier running of the car, and to judge his current consumption accordingly. Another unexpected result was the tendency of the motor-man to permit the car equipped with ball bearings to overrun stopping places, because of too late application of the brakes. It was also found that the energy saving depends to a great extent upon the distance between stops. With a run of two or three blocks the current can be cut out sooner, resulting in a longer period of coasting on the ball-bearing-equipped car than on the car not so equipped. As the length of run is increased the difference between the coasting periods of the two cars is also increased.

One of the most important advantages of cars equipped with ball bearings is the ease with which the empty cars can be rolled back and forth by hand in the terminals and repair shops. At the instant of starting the car the ball bearing shows its greatest saving in energy consumption, for once the car is in motion the saving is much less.

To determine experimentally the force required to move a car, a dynamometer was inserted between the pulling power and the car. The average of ten separate tests was recorded as representative of certain cars, and

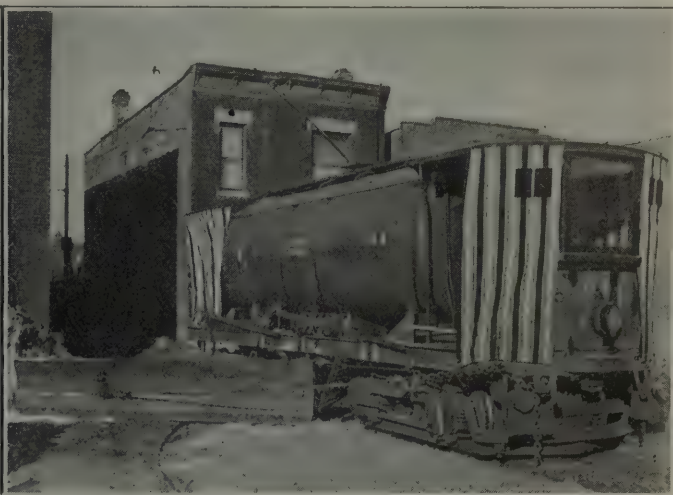
Comparison between the figures shows that on the ball-bearing-equipped cars greatest resistance occurred immediately after stopping, decreasing by more than 5 per cent within ten minutes, while the other car showed the smallest resistance while warm and increased by nearly 20 per cent within ten minutes.

Sprinklers and Work Cars Make Good Snowplows at Chicago

Wings Hinged to Car Side Sills Prove Effective as Supplementary Snow-Fighting Equipment on Chicago Surface Lines

THE snow equipment of the Chicago Surface Lines at the time the first storm broke this season consisted of ninety-six sweepers, ten power plows, forty-nine wing plows and eighty-one drag plows. These were so distributed as to give the best results in taking care of the thousand or more miles of single track within the city limits. The storms beginning on the night of Jan. 5 were of exceptional severity and the need of additional emergency equipment was impressed on the rolling stock and shops department of the company.

Lying in the various car stations were numerous sprinkling cars, put away for the winter months. Seven of these double-truck cars, equipped with four GE-80 motors each, have now been furnished with wing plows and added to the winter equipment. The wings are 15 ft. long and 30 in. high, the weight being 1500 lb. Each is constructed of 3-in. oak covered with sheet steel on the face. At the bottom is a steel plate $\frac{1}{2}$ in. x 12 in. The wing is curved at the top and bottom so as to keep snow rolling when in action. It is best operated at an angle of 45 deg., being held in position by a $\frac{3}{4}$ -in. chain



SPRINKLER CAR EQUIPPED WITH WINGS FOR SNOW FIGHTING—AT LEFT WING FOLDED AGAINST SIDE OF CAR, AT RIGHT WING EXTENDED AT ANGLE OF 45 DEG.

the results show that with cars weighing 13.7 tons empty it took an average force of 10.6 lb. per ton and 37.8 lb. per ton respectively to move cars with and without ball bearings. These tests were made on cars which had been standing idle for two days.

Further tests made on the German railways to determine any change in the force required to move the two types of equipment after a period of continuous service gave the results shown in the tables above.

or cable. The stress on the plow when bucking heavy snow embankments is indicated from the fact that a 24-ft. chain was stretched 32 in. when in action.

The hinge connection and heel of the plow are so arranged that the wing is hinged on a $2\frac{3}{4}$ -in. shaft by means of a huge U-shaped forging. The wing is pivoted to this forging with a 2-in. bolt. This leaves the wing free to move up or down if it strikes an obstacle. The heel of the plow is carried 3 in. above the rail. One

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

A Commissioner's Woes

Not Since Days of Mayor Gaynor and Mr. Whitridge Has New York Enjoyed a Letter Such as This

Seymour Van Santvoord, chairman of the Public Service Commission of the Second District of New York, resigned on Feb. 1, the day on which his term of office expired. In a letter to the Governor Mr. Van Santvoord said in part:

NOBLE ORDER OF HEAD-HUNTERS

"Even if under the stress of weightier matters you had overlooked the fact that my term of office expires on Feb. 1, it is inconceivable that the Most Noble Order of Head-Hunters has not recalled it to your mind, and thus I have been both surprised and disappointed that Your Excellency has not seen fit either to advise me when I am to realize the joy of welcoming my successor, or to honor me with any suggestion whatsoever of your wishes in the matter.

"With reluctance and regretfully I am thus compelled to assume that you have classed me with those who, for the sake of the salary, are willing to cling to an outworn honor and the shadow of a bygone service until the scales of expediency shall have been adjusted to that nice balance which, in the decadent days, appears to be a *sine qua non* in the choice and confirmation of the appointee to an important State office. Any such statement is as foreign to me as the idea is abhorrent; if a contrary impression has been created by my four years of painstaking and conscientious service—commonplace although it may have been in other respects—I can understand something of the chagrin, if not actual bitterness, with which Mr. Straus in acceding to your request nevertheless declared that a member of the Public Service Commission is indeed fortunate who can retire from office with even as good a reputation as he enjoyed when he undertook it.

LIFE 'ONE DEMD HORRID GRIND'

"I think it must be plain to you that no tawdry salary would permit me to stay lashed to this Ixion's wheel for one moment longer than the imperative sense of duty commanded. And no less from what I have implied than from what I have stated, you can readily understand that since for me life has become 'one demd horrid grind'—to borrow the weird but expressive imagery of the immortal Mantilini—I have been sustained alone by the Star of Hope which the Legislative Manual expressly states is due to arise in my official horizon on Feb. 1, 1918.

"Governor, Governor, why did you so

thoughtlessly, how could you so unfeelingly, refuse to a suffering soul, who has realized the vanity of human aspirations and the nothingness of human greatness, the long-coveted mandate, 'Thou faithful servant, go in peace'—or otherwise even, if only permitted to go without actual dishonor? What evil have I done that thou, my friend and respected superior, shouldst deliberately withhold the word of hope which would have cheered my drooping spirits and the ray of light which would have guided my eager steps toward that chapel of official forgetfulness termed 'ex' for the consolations of which, in the mercy of Providence you yourself may sometimes anxiously yearn.

"With unaffected sympathy for the sorrows of the next chairman, and with heightened respect for the sorrows of my predecessors, I remain—shall I say for the last time?

Carhouse Fire in Wheeling

The Bay Island operating carhouse of the Wheeling (W. Va.) Traction Company and twenty-nine double-truck air-brake passenger cars and one new work car, all 5 ft. 2½ in. gage were destroyed by fire, probably incendiary, at 2 a. m. on Feb. 4. The company is now operating about 75 per cent of service. The Jewett Car Company has had fourteen double-truck cars under construction for the company for some time and completion of this rolling stock will be hastened. The railway is looking for complete cars of broad gage for temporary use and will arrange speedily for the permanent replacement of the equipment.

New United Engineering Society Officers

The following officers were elected for the ensuing year, at the annual meeting of the trustees of the United Engineering Society, held on Jan. 24:

President, Charles F. Rand, member of the American Institute of the Mining Engineers.

First vice-president, Calvert Townley, member American Institute of Electrical Engineers.

Second vice-president, Robert M. Dixon, member of the American Society of Mechanical Engineers.

Treasurer, Dr. Joseph Struthers, member of the American Institute of Mining Engineers.

Secretary, Alfred D. Flinn, member of the American Society of Civil Engineers.

Chairman of the finance committee, J. Vipond Davies, member of the American Society of Civil Engineers.

West Side Report Ready

Committee Which Has Been Considering Removal of Tracks from Surface Reports to Legislature

The report of the Commission on West Side Improvement, which was submitted to the Legislature of the State of New York on Jan. 31 recommends the appointment of a commission of seven members with ample power to build one or more tunnels under the Hudson River, either with public money or by some arrangement with private capital, and to make similar arrangements for a terminal on the West Side with zone connections, which the railroads serving this city shall build themselves or be compelled to use on a co-operative basis if built by others.

A bill repealing all of the laws heretofore enacted in relation to the West Side improvement was sent to Albany with the report and was later introduced into the Legislature. The purpose of repealing the present laws was to clear up all legal entanglements.

OUTLINE OF IMPROVEMENTS

A brief outline of the things the proposed commission should do in order that the West side problem may be successfully solved provides for:

A subway or elevated terminal system on the West Side extending south from Sixtieth Street to Canal Street or further as traffic conditions may require, with intermediate zone stations, the system to be used by all railroads.

One or more freight tunnels under the Hudson River connecting the terminal system with classification yards in New Jersey.

Tracks of the New York Central Railroad Company should not extend east of their present location and should be covered and depressed to a depth to be determined by engineers. All of the improvements along the river front from Seventy-second Street to Spuyten Duyvil should not be permitted to interfere with parks and residential features.

The tracks of the New York Central Railroad on the West Side should be removed from grade. Steam as a motive power should be eliminated.

Public Service Commissioner Hervey said that the report did not reach the kernel of the situation; that it involved the removal of all the safeguards which the Governor and Legislature had placed around valuable public rights on the West Side, and that if the report was accepted the whole subject would have to be reopened, with no prospect of anything being accomplished for some time.

New Franchise for Montreal Tramways

Review of Provisions of Contract for Thirty-five-Year Franchise Signed by Representatives of the City and the Company

In the contract prepared by the Tramways Commission for the city and the Montreal (Que.) Tramways, and signed by representatives of both, as submitted to the Quebec Legislature on Jan. 30, the company receives a franchise until March 24, 1953, for a surface railway system. The rights, privileges and franchises possessed already by the company in the city are annulled, and any that it possesses in other municipalities or will possess will be annulled by the mere fact of these territories being annexed to the city. In such cases the annexed territories would fall under the terms of the new contract.

COMMISSION FOR CITY

To obviate the incessant bargaining and bickering between the city and the company, a permanent tramway commission for Montreal is to be created, with jurisdiction over all the lines of the Montreal Tramways, or any of its subsidiaries, so far as finances, operation, extension and disputes are concerned. This commission, which will be appointed as soon as the new contract is put in force, is enjoined within sixty days to set a uniform fare within the city limits and an additional territory that will wipe out in various outlying districts the double fares now obtaining. The right of transfer may still be kept, but the commission is instructed to enforce transfers in which will be punched the exact point of transfer, instead of the latitude which the present transfers permit.

Among other changes made obligatory, or within the power of the commission to permit, are the formation of labor unions by the employees, the transportation of freight at times and under regulations of the commission, and the giving of an autobus franchise to the tramways whenever the commission feels that circumstances justify it.

CAPITAL VALUE \$36,286,295

The capital value of the company is placed at \$36,286,295, and the company cannot pay more than 10 per cent on this fixed capital. The amount per revenue car mile it can spend on operation costs will be fixed by the commission, and the establishment of various funds is ordained, as follows: A fund of \$500,000 to be created by \$100,000 instalments in five years to pay off old debts and excesses in the operating fund beyond the amount set each year by the commission; a maintenance and renewal fund; a tolls reduction fund; and a reserve contingency fund. An annual sum of \$500,000 is to be given to the city, and when everything else is provided for, including dividends of the company, the surplus is to be divided as follows: 30 per cent to the city, 20 per cent to the company and 50 per cent for the reduction of fares. Whenever the latter fund passes \$2,-

500,000 it will be applied to the reduction of fares, and that will continue to be the case through the life of the contract.

In the second article the Montreal Tramways Commission is created as a controlling permanent body. The third article gives it three members to be named by the Lieutenant-Governor-in-Council immediately after the contract goes into force. The president and vice-president will be named by the government as well. Any vacancy will be filled from Quebec in the same manner as soon as such vacancy is known to the government, but the fact of there being a vacancy will not prevent the other members from exercising their functions. Each member is to be appointed for ten years, but members can be removed for cause by the government.

APPEAL FROM COMMISSION DECISIONS

Two members make a quorum of the commission. The remuneration will be fixed by the government and paid monthly. The commission is allowed to make its own rules, which will be obligatory as soon as the Public Utilities Commission has approved of them and the city and other municipal corporations have been notified. Appeals from the decisions of the commission can be taken by either party to the contract or by any municipality interested to the Public Utilities Commission on all questions of law and of competence with reference to the contract and all decisions of the commission. The appeal thus taken is final except on questions of law.

RATES OF FARE

Fares in force from the date of the contract, in as well as outside of the city, which the company is authorized to collect, are to continue in force until they are modified by the commission. Within the uniform rate territory, as well as in other municipalities, the commission is to fix different tariffs for all passengers at certain hours of the morning or night, and it may fix higher tariffs for night hours from midnight to 5 a. m.

The commission may establish for school children or apprentices a lower tariff, which shall apply only during week days, from 8 a. m. to 6 p. m. for school children and for apprentices from 6 a. m. to 7 p. m. Children less than five years old are to be carried free.

The amount to be allowed for operation is to be based on revenue car-miles, exclusive of carhouse and car-yard miles. This sum will be known as the operating allowance, and will cover operating expenses and all taxes levied against the company. The expenses of the commission and defense and settlement of claims are also to be charged to this account, and the company is also obliged to hold a certain sum in reserve, to be determined later, for the settle-

ment of such suits and claims as may be carried over the operating year.

The commission is annually to determine the amount of the operating allowance. If in each year the company has not exceeded its operating allowance then the commission is to permit the company to take out of gross revenues a sum to be known as the operating profit, which is to be equivalent to one-eighth of 1 per cent on the total average capital value for that year, and such operating profit is to belong to the company. If, on the other hand, there has been an excess expenditure, this must be covered from gross revenues, or if more than one-eighth of 1 per cent, it must be made up from the guarantee fund.

NO DIVIDENDS OVER 10 PER CENT

During the life of the contract the company is prohibited from paying dividends in excess of 10 per cent. The city is to receive out of gross revenues over and above all other amounts to which it may be entitled, the sum of \$500,000 a year during the continuation of this contract, payable quarterly. A contingent reserve fund is also provided for by the deduction of 1 per cent from gross revenues, until such fund shall amount to \$500,000.

A tolls reduction fund is to be instituted, and if at the end of any year this fund exceeds \$1,000,000 the commission may reduce the fares on the tramways. Reduction of fares is to be obligatory when the tolls reduction fund reaches \$2,000,000, such reduced fares to remain in force until such time as the commission deems it necessary to increase them again. If the tolls reduction fund continues to increase, and reaches a further sum of \$2,500,000, fares are to be further reduced.

RIGHT OF EXPROPRIATION

On March 24, 1953, and at the expiration of every subsequent five-year period, the city is to have the right, after six months' notice given to the company within the twelve months immediately preceding March 24, 1953, to appropriate for itself the railway plant, etc., of the company within and without the limits of the city, by paying the value fixed by arbitrators and 10 per cent over and above the estimate. Such arbitrators are to be appointed, one by the city, one by the company and the third by a judge of the Superior Court sitting in and for the district of Montreal.

Should the city exercise the right conferred upon it by the purchase clause, it is agreed that the valuation of \$36,286,295, fixed by the present contract, shall in no way bind the arbitrators in establishing the purchase price payable by the city. The purchase price is also to comprise all privileges, rights and franchises of the company in any municipality wherein the assets so acquired are situated, and the city is not to pay for the value of such privileges, but is to have the right to operate the system of tramways so purchased in any municipality in which railway property of the company is located.

Advisory Council on Labor

New Body Will Formulate Program and Recommend Administrative Machinery on Every Phase of Employment Problem

Reports from Washington indicate that the recent appointment of an advisory council to the Secretary of Labor is of far more importance, broadly speaking, than some of the events to which the daily papers have given far greater space. The council is expected to determine the policy which shall keep labor and capital working together during the war. Incidentally, if the work of its members is far-seeing—as the constitution of the council gives warrant for expecting—it should have a tremendous influence on the socio-economic conditions under which we shall live after the war. Briefly the program includes:

THE PROGRAM

1. A means of furnishing an adequate and stable supply of labor to war industries. This would embrace:
 - (a) Satisfactory system of labor exchanges.
 - (b) A satisfactory method and administration of training of workers.
 - (c) An agency for determining priorities of labor demand.
 - (d) Agencies for dilution of skilled labor as and when needed.
2. Machinery which will provide for the immediate and equitable adjustment of disputes in accordance with the principles to be agreed upon between labor and capital and without stoppage of work. Such machinery would deal with demands concerning wages, hours, shop conditions, etc.
3. Machinery for safeguarding conditions of labor in the production of war essentials. This to include industrial hygiene, safety, women and child labor, etc.
4. Machinery for safeguarding conditions of living, including housing, transportation, etc.
5. Fact-gathering body to assemble and present data collected through various existing governmental agencies or by independent research to furnish the information necessary for effective executive action.
6. Publicity and educational division which has the function of developing sound public sentiment; securing an exchange of information between departments of labor administration; and promotion in industrial plants of local machinery helpful in carrying out the national labor program.

The first four divisions cover matters familiar to all manufacturers, contractors and engineers. Subdivisions (b), (c) and (d) of function (1) represent activities made necessary by the war. The true significance of the establishment of the body is appreciated when attention is directed to the sixth division, and when one recalls the activities of the labor division of the British Ministry of Munitions and the influence that its work of the same broad scope has had on industrial England.

Incidentally, it may be said that the council last week recommended to the Secretary of Labor (1) the organization of a board to formulate an arrangement for ending strikes, and (2) the centralization in his department of the industrial service divisions of the various branches of the war machine. Both plans have been approved by the secretary. The first of them is absolutely essential if co-operation is to replace strife.

The council is headed by John Lind, former governor of Minnesota, and

envoy to Mexico, representing the public. Waddill Catchings, president of the Sloss-Sheffield Steel & Iron Company, and of the Platt Iron Works, and A. A. Landon, general manager of the American Radiator Company, represent the employers. Labor's members are John B. Lennon, treasurer of the American Federation of Labor, and John J. Casey, former member of Congress. Dr. L. C. Marshall, of the University of Chicago, is the economist member and Agnes Nestor, Chicago, represents women.

Rapid Transit Plan Explained

Engineer Makes Address Outlining Plans for Future Transit Construction for Detroit

H. M. Brinckerhoff of Barclay Parsons & Klapp, New York, N. Y., who reported on a system of rapid transit for Detroit, addressed the members of Detroit Engineering Society recently.

By maps and lantern slides he illustrated the subway and overhead rapid transit system which he claimed could be completed by 1950, at which time he predicted Detroit would have a population of 2,000,000 and a ground area of 150 square miles. Mr. Brinckerhoff is reported to have said:

\$29,000,000 OUTLAY

"It is not expected to put through this project, which would mean an initial outlay of about \$15,000,000 by the city and \$14,000,000 by the local railway, at this time when war has raised the costs of all construction work. But it takes years before a plan can be fully worked out and agreements signed. By that time the war will be over.

"If rapid transit facilities are not provided people will be forced into tenements. Woodward Avenue cars are now carrying 4,640,000 passengers per track-mile per year. The only line carrying more is the New York subway with 4,970,000. Forty per cent of the riders on Woodward Avenue travel more than 3 miles, which places it in the rapid transit class.

SURFACE CARS FOR SHORT HAULS

"We need the surface cars for short hauls, with transfers to both subway and overhead lines for longer hauls, these latter lines also taking care of the interurban lines. By a partnership agreement between the city and the Detroit United Railway, operating the local city railway lines, the proposed system, which will give maximum service to all, will be completed in thirty years and in time will all revert to the city."

Mr. Brinckerhoff's plan is for subways on Woodward Avenue from the river to the boulevard, a short cross-town spur at Gratiot and another at the boulevard; elevated railroads to continue the subways up Woodward

Avenue and out Fort, Michigan, Grand River, Gratiot and Jefferson, with additional lines running from the river to the boulevard on the west side and from the boulevard out Hamtramck on the east.

Toledo Report Filed

Twenty-five Year Franchise Proposed for Community Traction Company With 6 Per Cent Return.

The Street Railway Commission of Toledo, Ohio, filed its report with Mayor Cornell Schreiber on Feb. 1. It has been two years in course of preparation. The signatures of the members of the commission are attached, with that of Judge Ralph Emery, who acted as attorney, but the name of Henry L. Doherty, chairman of the board of the Toledo Railways & Light Company, does not appear.

The report provides for a twenty-five year franchise to be granted to a so-called community traction company, which it is proposed to organize to succeed to the ownership of the railway property of the Toledo Railways & Light Company. The stock is to be held by trustees for five years, and during this period Toledo citizens may purchase it on the installment plan at \$10 per share.

6 PER CENT RETURN PROVIDED

It is proposed to fix the rate of fare so that the stockholders will receive dividends of 6 per cent on their holdings, with a premium of 10 per cent in the event the city purchases the property. A sliding scale of fares from a 5-cent maximum, with free transfers, down to ten tickets for 25 cents, with a 1-cent charge for transfers, is provided. The dividends and margin for the purchase of the property will have to be worked out between these two extreme limits.

Provision is made to the effect that the city may lease, operate and eventually own the street railway property by paying 25 per cent of the purchase price down and 2 per cent annually on the principal and 6 per cent dividends to the stockholders.

Railway Taxes Lifted

The prosperity of Japan is such that taxes are being reduced on local transportation in the cities. Mr. Shoda, Minister of Finance, announced on Nov. 29 that all railroads and electric railways in the Empire, exceeding 100 in number, had presented a petition for relief from transportation taxation, and that the Ministry had decided upon its cancellation. A bill for doing away with this tax was introduced in the last Diet, but did not pass. The tax was levied among the first of special war measures to raise revenue during the Russo-Japanese war, and has remained in force for twelve years. The receipts therefrom amount to \$2,500,000 annually, of which Tokio lines pay almost \$1,000,000. When the tax is cancelled, city tram fare in the capital will be reduced one-half cent on each trip.—*Financial America*.

Recommends Service at Cost for Massachusetts

Committee Which Investigated Electric Railway Situation Reports to Legislature in Favor of Plan Proposed by Investors

The street railway investigation commission, appointed last year to study the electric transportation situation in Massachusetts, filed its report this week with the Legislature. The chief recommendation of the majority of the commission is that a service-at-cost plan be adopted under which fares would automatically rise as income declined and vice versa. The plan should embody the following fundamental features, the report says:

1. Establishment of a sliding scale of fares, so arranged that when the schedule of fares in operation does not yield a revenue sufficient to pay the cost of the service the next higher schedule of fares shall become effective, and when the fares yield a revenue greater than the cost of the service, a corresponding decrease in the rate of fare shall be made.

2. Creation of a reserve fund, which shall serve as a balance wheel in the system, so that a rapid fluctuation of fares due to seasonal or other conditions may be eliminated.

3. Establishment of a depreciation and maintenance fund, so that the electric railway properties shall be kept up at all times to the proper operating efficiency.

4. Provision for the rehabilitation, extension and improvement of lines during a period of years following the acceptance of this plan.

5. A director to be appointed by the governor of Massachusetts to the board of directors of each electric railway operating under this plan.

6. Supervision of the electric railways accepting this plan by district representatives, appointed by the governor or by the Public Service Commission; expenses of such supervision to be borne by the companies, but in no case to exceed a certain fixed percentage of operating expenses.

7. Provision for arbitration proceedings relative to certain conditions which might arise.

8. Provision whereby the State, or any political subdivision thereof, may purchase the entire property of a company, accepting this plan, at its determined investment value, or under any other provision of existing or future statutes.

9. A return to the investors of 6 per cent per annum on a fixed investment value. The amount of such investment value to be determined by the Public Service Commission and to include such sums as have been prudently and honestly invested and conserved with proper diligence, due consideration being given to the present physical condition of the property. The investment value from time to time to be increased by such sums as the commission shall certify have been prudently spent and are properly chargeable to capital.

10. The acceptance of such a plan to be optional with the individual companies.

11. Legislation allowing the Boston Elevated Railway (including its leased lines) to accept this plan.

12. In case the service-at-cost plan is accepted by any company, such funds as the Public Service Commission shall consider necessary for the establishment of the reserve, depreciation and rehabilitation funds or for improvements immediately necessary, shall be raised by an issue of capital stock, either preferred or common.

OTHER RELIEF RECOMMENDED

The investigating commission further recommends:

1. That jitneys be declared common carriers and placed under the supervision of the Public Service Commission.

2. That electric railway companies be allowed to operate motor vehicles (not running on rails or tracks) as auxiliaries or feeders.

3. That authority to grant permits to electric railways to become common carriers of newspapers, baggage, express matter and freight, now vested in local authorities, be transferred to the Public Service Commission.

4. Abolition of the commutation or excise tax and passage of an act requiring electric railways to maintain in good repair but not to renew or replace the paving, upper planking or other surface material or the base thereof between the rails and tracks, and in the case of unpaved streets for 18 in. outside the rails.

5. That if a municipality refuses to grant an electric railway permission to alter its tracks in order that a more improved type of equipment may be used, the right of appeal shall be had to the Public Service Commission.

6. If an alteration is made in the location of electric railway tracks in highways, no portion of the expense shall be borne by the railway except when such alterations are made upon petition of the railway.

7. That electric railways shall not be obliged to bear any expense in connection with alterations, strengthening or construction of bridges or the approach thereto.

Messrs. Gibbs, Hays and Forbes signed the report but presented dissenting statements advocating reduction in subway and tunnel charges now paid by the Boston Elevated. Messrs. Worrall, Bunting and Donovan filed dissenting reports. Mr. Bunting advocated public ownership, the majority having held that such would be unwise at this time. Mr. Worrall submitted a "service-at-cost" plan of his own which provides for a railway commission of three members appointed by the Governor.

As a result of its investigation, the commission concluded that the following causes have contributed to the present unsatisfactory situation relative to the railways of Massachusetts: Depreciation of the purchasing power of

the nickel; growth of the automobile business; taxation and highway maintenance requirements; improvement of facilities; non-paying lines; failure to provide for depreciation and obsolescence, and lack of co-operation between the railways and the public.

In connection with the recommendation of a service-at-cost plan, the commission did not present a definite bill, since it did not deem it expedient, at this stage, to submit a bill limiting the plan to any particular set of provisions.

Coal-less Monday Order Continues

Public Utilities Show Savings in Coal of from 21 to 25½ per Cent from Order

Dr. H. A. Garfield, the fuel administrator, William G. McAdoo, director general of railways, and several State fuel administrators who met in Washington for conferences on Feb. 4, 5 and 6, have decided to continue in effect the orders preventing industry on Mondays, notwithstanding the fact that previous authoritative information to the Washington correspondents had been that the order would be rescinded.

In making public this decision continuing the order, Dr. Garfield called attention to the fact that a "change in weather conditions" which is hoped for of a favorable character must take into consideration the question of the possibility of floods when the thaws followed the present period and condition of snow and ice. Flood conditions, he said, must be figured in weather conditions, and the apprehension now exists in Washington that flood conditions may tie up transportation of coal as badly as snow and ice have tied it up.

In referring to the effect of the closing order Dr. Garfield said, in part:

"The effect of the closing order is not easily measured statistically, the more so because of extraordinary weather conditions, but the State fuel administrators reported that substantial savings had been effected. The most exact estimates were submitted by the secretary of the National Committee on Gas and Electric Service. These figures were furnished by the electric light, power and gas companies of twenty-nine of the largest cities of the country. The weighted average of the saving during the five days from Jan. 17 to 22, inclusive, was 21.2 per cent, while the saving for Monday, Jan. 28, was 25.5 per cent of the amounts usually consumed. Mr. Garfield is also informed by the secretary of the National Committee on Gas and Electric Service, Mr. Elliott, that the public utilities concerned did not consume on other days appreciably more than the normal amount of coal as a result of the shutdown. It is estimated that the public utilities reporting furnish a fair index of the general saving in the communities involved."

In consequence the Monday closing order will be continued until such time as the change in weather and resulting improved transportation conditions war-

rant its suspension. A close watch will be kept upon conditions, however, and further consideration will be given to the subject as soon as there is reasonable assurance of relief. It is also hoped that, with the shut-down on Monday, Feb. 11, and the closing in many States on the day following, Lincoln's Birthday, it will be possible thenceforth to rely upon embargoes and the preference in movement of food and fuel ordered by the director general of railroads.

Strike in St. Louis

Trainmen of United Railways Demand More Pay and Recognition—Joined by Shop Workers

The striking employees of the United Railways, St. Louis, Mo., on Feb. 5 awaited action from the board of directors of the company who were in executive session. It was not expected that the result would be known until late on Feb. 5, possibly not until Feb. 6. Pending the meeting of the board of directors on Feb. 5 the railway refused on Feb. 4 to send representatives to the conference called for the afternoon of Feb. 4 in the Mayor's office.

It is stated that the company is opposed to the recognition of the union, but is willing to arbitrate the question of wages and hours. It was announced on Feb. 5 that many men who went out were asking to be taken back. Some of these men were assigned cars immediately. Ninety-two cars out of the normal 1100 were being operated on the principal lines on Feb. 5. During the morning hours, car windows were smashed, trolley wires were cut and spikes driven between the track and the guard rails in an effort to derail cars. Rioting occurred at several points and many persons were hurt. It is understood that the strike could be adjusted quickly but for the question of the recognition of the union by the railway.

The electrical workers and more than 250 shopmen joined the trainmen on Feb. 5. They demand eight hours and a new wage scale.

Legislation to Protect Women

It seems more than likely that the employment of women as conductors on the surface lines in New York City and as guards in the Brooklyn subways will result in the passage of legislation in their interest at the session of the Legislature now in progress. Already several bills looking toward these ends have been introduced. The measures are all more or less along the same general lines. They would fix the hours of labor and prescribe an age minimum. The bill introduced in the Senate by Mr. Nicoll would, for instance, provide:

"No female minor under the age of twenty-one years shall be employed in the operation of any street, surface, elevated or subway railroad within this State, and no woman employed in the operation of any such railroad shall be

allowed or permitted to work more than nine hours in any one day, or more than six days or fifty-four hours in any one week, or before 6 o'clock in the morning or after 10 o'clock in the evening of any day, nor shall any woman be knowingly so employed within four weeks after she has given birth to a child."

News Notes

Paving Case Goes Against Company.

—The Supreme Court of Ohio ruled on Feb. 1 that, under the Tayler franchise, the Cleveland Railway is liable for the cost of paving the Superior Avenue viaduct. The court said that if there was any doubt about the construction or application of the franchise the city should prevail. The court held that the replacing of blocks constituted repair and not repaving. For this reason the company must stand the cost.

No Hearing on Tax Appeals.—Upon agreement between Frank S. Katzenbach, Jr., counsel for the Trenton & Mercer County Traction Corporation, and Charles E. Bird, counsel for the City of Trenton, N. J., there will be no hearing in the matter of the appeals being taken by the company from the assessments of the property for taxing purposes. Both attorneys appeared before the Mercer County Tax Board and offered that the testimony taken in the case of the appeals last year be considered the same as having been taken in the present case. The 1916 appeals are now before the State courts. The company lost in the 1915 appeals.

Municipal Railway Appropriation Bills Go Over.

—At a recent meeting of the City Council of Seattle, Wash., two appropriation bills introduced in Council on Sept. 17 transferring \$12,000 from the general fund and the light department depreciation fund respectively for the completion of the Ballard extension of the municipal railway were indefinitely postponed. Judge Calvin S. Hall, in a suit brought by Theodore S. Haller, held that money could not be appropriated from either of these funds for the construction of a railway. It was on this decision that the plan to extend the railway was temporarily held up until utility bonds authorized for the purpose by the Council could be marketed.

Navy Still Needs Binoculars.—The navy is still in urgent need of binoculars, spy glasses and telescopes. Several weeks ago an appeal through the daily press resulted in the receipt of more than 3000 glasses of various kinds. But this number is wholly insufficient. Articles should be forwarded by mail or express to Hon. Franklin D. Roosevelt, assistant secretary to the navy, Naval Observatory, Washington, D. C., by whom they will be acknowledged. Those not suitable for naval

use will be returned to the sender and those accepted will be returned at the termination of war, although it is impossible to guarantee them against damage or loss. The government will pay \$1 for each article accepted, which sum will constitute the rental price or in the event of loss the purchase price of such article.

A Painter the Latest Regulator.—Alderman W. H. Zeiser, a painter by trade and chairman of the committee on railways of the new Board of Aldermen of Louisville, Ky., has proposed a bill for the appointment of a city street railway commissioner to act as technical adviser to the city in matters affecting fares, quality and quantity of service, and transfers, etc., the installation of separate accommodations for white and colored passengers or the operation of separate cars, the creation of a board of arbitration to settle differences between the commissioner named above and the company, and a stipulation that the city, on failure of the company to obey the board of arbitration, shall deprive it of use of the streets.

Plea for Minnesota Line.—W. L. Luce, head of the Electric Short Line Company, known as the Luce Line, a gasoline-electric line extending from Minneapolis to Hutchinson, Minn., has asked the Senate committee on interstate commerce at a hearing in Washington to take over the line along with other railroads. Mr. Luce fears that if the line is not taken over by the government the company will lose practically all the through business. Because the line is now a mile shorter than one steam line and 15 miles shorter than another between Minneapolis and Hutchinson it has been getting delivery of through freight to and from all Chicago lines. It is Mr. Luce's belief that with these long lines taken over by the government the physical advantage would count for naught. The Luce line is 60 miles operated and 75 miles right-of-way.

Association Meeting Programs

Wisconsin Electrical Association

The annual convention of the Wisconsin Electrical Association will be held in Milwaukee, Wis., on March 27 and 28, with headquarters at the Pfister Hotel.

Midwinter Convention of A. I. E. E.

The American Institute of Electrical Engineers will hold its sixth midwinter convention at the United Engineering Societies' Building in New York City, on Feb. 15 and 16. After the opening remarks of President E. W. Rice, Jr., president of the General Electric Company, the first session will be devoted to discussion on the rating and selection of oil circuit breakers. The other sessions will be largely taken up with scientific matters. Mr. Rice will speak also at an informal dinner at the Café Boulevard at 6.30 p. m. on Friday.

Financial and Corporate

War Finance Bill Presented

**Plan for Federal Financing Corporation
—Currency Comptroller Says Util-
ity Credit Must Be Preserved**

The war finance corporation bill prepared by Secretary McAdoo was introduced in Congress on Feb. 4. As noted last week, this bill contemplates the creation of a \$500,000,000 corporation to make loans and advances to essential industries and otherwise assist in private financing.

In commenting upon the bill Mr. McAdoo says:

"Many instances have been brought to the attention of the Secretary of the Treasury and of the Federal Reserve Board where railroads, public utilities, power plants, etc., have been prevented from obtaining the necessary advances to enable them to perform vital service in connection with the war because the bank credits, ordinarily available to them, are being absorbed by the government itself.

"It is believed that the proposed bill has been wisely and conservatively conceived as a war measure to give relief from this condition during the period of the war. The banks of the country would, no doubt, scrutinize with the utmost care both the loans themselves and the security therefor, and would exercise their individual judgment upon the borrower's credit before assuming a liability for the amount of the loan. They would be under the necessity of advancing, out of their own resources, 25 per cent of the amount loaned. The bill would authorize advances to a bank of only 75 per cent of the amount loaned by the bank to a war industry.

"It is confidently believed that the mere existence of the machinery which this bill would establish would of itself maintain confidence to such an extent that the aid of the corporation would only in relatively few cases be called for, and that the banks would be able to take care of the requirements of this class of borrowers and be ready to do it knowing that in case of need loans of that character would be available for rediscount.

"The provision permitting direct loans by the corporation in exceptional cases for not more than five years is intended to provide for those rare cases where it may be made to appear to the corporation that a meritorious borrower is being unwisely discriminated against by the banks.

"The bill provides for approval by the corporation, through a system of licenses, of issues of securities in excess of \$100,000 with a view to preventing the use of capital in unnecessary expenditures during the period of the war. This is of great importance in order to conserve the supply of new capital and make it available for gov-

ernment loans and essential war purposes."

In his report for 1917 the Comptroller of the Currency, John Skelton Williams, emphasizes the importance of maintaining the efficiency and credit of utilities. If such enterprises are allowed to sink into inefficiency, he states, much of the most important war work of the government will be crippled or paralyzed. Continuing, Mr. Williams says:

"The first and most direct relief to the utilities can be given by the state commissions and municipal and local authorities, with the broad-minded cooperation of the people generally. It is essential that forbearance and consideration be exercised by these, and that the corporations also be permitted to make such additions to their charges for service as will keep them solvent, protect their owners against unjust loss, and give them a basis of credit on which they may obtain the funds with which to meet the strain put on them by the government's needs. The breaking down of these corporations would be a national calamity."

Another Road Junked

The Alton & Jacksonville Railway, Alton, Ill., went out of business on Jan. 31, and the entire property will be sold as junk by its owner, John J. Cummings, Chicago. The last car left Alton at midnight, and it was said that wreckers were prepared to tear up the tracks at Jerseyville the following day.

The road, which is about 21 miles in length, said to represent an original cost of \$500,000, never succeeded as a financial venture and five years ago a protective committee of bondholders forced a receivership. Later Mr. Cummings obtained the property. The Illinois Public Utilities Commission last December issued an order directing the road to cease operations.

The case of the company before the commission was reviewed in the *ELECTRIC RAILWAY JOURNAL* of Feb. 2, page 248.

New Bay State Issues

Judge Dodge of the United States Court on Jan. 31 issued three orders in the case of the Bay State Street Railway, Boston, Mass., in the hands of W. B. Donham as receiver, as follows:

1. The receiver is authorized to execute the permanent equipment 6 per cent collateral gold notes to the Old Colony Trust Company, as trustee, and is authorized to set aside and deliver the permanent notes in exchange for the temporary receipts for such notes now outstanding to the amount of \$1,308,000.

2. The receiver is authorized to settle suits or claims for personal injuries or damages to property arising out of

accidents or occurrences prior to the appointment of the receiver, the amount not to exceed \$50,000 in the aggregate.

3. The receiver is authorized to pay out of funds on hand \$30,000 of the principal of the mortgage of the Brockton & East Bridgewater Street Railway maturing on Feb. 1 and also the sum of \$39,240 interest on the car trust notes of the Bay State Street Railway due on Feb. 1.

Another Seattle Tax Proffer

**Puget Sound Company Repeats for
1917 Its 1916 Offer, Now Being
Reviewed by the Courts**

The Puget Sound Traction, Light & Power Company, Seattle, Wash., proposed to the city of Seattle on Jan. 23 that it pay \$72,443, representing 2 per cent of its gross railway earnings for 1917, under the same conditions that payment of \$64,387 for 1916 was tendered a year ago. These figures indicate that the company's gross earnings for 1917 were \$3,622,175, as compared with \$3,219,389 for 1916.

In December, 1915, after the company had petitioned the Public Service Commission to be relieved of certain of its franchise obligations, including the payment of 2 per cent of its gross earnings to the city, the paving of rights-of-way, and any portion of the cost of bridges, a conference with Mayor H. C. Gill resulted in an agreement that planking should be done in lieu of paving, and that in the event the relief sought was granted by the Public Service Commission the amount of gross earning tax for that year should be refunded.

On Jan. 13, 1917, the company tendered payment of \$64,387 with the stipulation that the litigation started by the city to force compliance with the paving provision be dismissed, or withdrawn until final adjudication of its petition for relief. This payment was for 1916 earnings. The Council refused to accept payment under those conditions as agreed to at the conference with the Mayor in 1915, and the amount was returned to the company. The city then brought a suit to recover the amount. Payment of the 1917 tax is tendered under similar conditions.

The Tacoma Railway & Power Company and the Pacific Traction Company, both subsidiaries of the Puget Sound Traction, Light & Power Company, operating in Tacoma, Wash., recently tendered the City Comptroller of Tacoma a check for \$11,111, covering 2 per cent of the gross earnings on their passenger traffic, and 5 per cent of their freight and power business during the last six months. The \$11,111 exceeds the previous semi-annual payment to the city by about \$500; while the passenger earnings showed an increase for the city of \$1,000, the freight and power earnings show slight decreases. The company apparently is not through with its protest made to the Public Service Commission last year, in which it was attempted to show that the city's tax on the gross earnings of the local companies was illegal.

New British Financing
Government Borrowings in 1917 Completely Overshadow All Other Capital Issues for that Period

With the continuation of strict supervision by the Treasury over new capital issues in Great Britain, the record of 1917 borrowings published by the London *Economist* is one almost entirely of government loans. Indeed, the amount of new capital raised for industrial purposes was only one-half of 1 per cent of the total.

The tramway and omnibus lines in 1917 raised £100,000 of new capital, as compared to nothing in 1916 and £432,500 in 1915. The accompanying table gives the details of 1917 new financing:

1917 CAPITAL ISSUES IN GREAT BRITAIN		
	1916	1917
British governm't loans	£554,071,100	£1,297,819,700
Colonial government loans ..	6,000,000	13,870,700
Foreign government loans ..	15,000,000	nil
British municipal loans	495,000	nil
British railways ..	1,679,000	nil
Foreign railways ..	384,000	nil
Mining cos.—		
Australian ..	7,500	nil
Other mines ..	15,000	nil
Merchants, etc. ..	102,500	nil
Manufacturing ..	1,449,300	1,377,900
Rubber	15,600	3,100
Oil	1,573,500	1,125,000
Iron, coal, steel, etc.	1,275,000	881,500
Electric lighting, power, telegraphs, etc. ..	102,400	214,000
Tramways and omnibus	nil	100,000
Motors	381,300	554,200
Gas and water ..	16,400	nil
Hotels, theaters, etc.	7,000	nil
Patents	27,000	nil
Docks and shipping	800,000	nil
Banks and insurance	275,000	1,500,000
Miscellaneous ..	1,259,800	1,149,900
	£585,436,400	£1,318,596,000

New York Earnings
Revenues of the Metropolitan Carriers Show Increase, but the Net Income Stands Still

Operating expenses, taxes and interest costs are still eating up gains in operating revenues. One indication of this is the reports of electric railways operating in New York City. Returns to the Public Service Commission for the First District show that the financial results for the quarter ended Sept. 30, 1917, with changes from 1916 were as follows:

Railway operating revenues	\$26,188,616	*\$2,518,396
Operating expenses ..	14,804,537	*1,804,977
Net corporate income	2,261,221	†721

*Increase. †Decrease.

The railway operating revenues of the Hudson & Manhattan Railroad for the quarter ended Sept. 30 amounted to \$1,016,368, an increase of \$100,749; net corporate income, \$104,940, an increase of \$7,279. Interborough Rapid Transit Company—operating revenue, \$8,909,308, an increase of \$519,719; net corporate income, \$628,673, a decrease of \$619,727. Manhattan surface roads, including the New York Railways, the Third and Second Avenue lines and oth-

er carriers—operating revenue, \$5,404,480, an increase of \$945,231; net corporate income, \$285,176, an increase of \$440,782. Brooklyn Rapid Transit System—operating revenue, \$8,288,813, an increase of \$434,505; net corporate income, \$1,176,738, an increase of \$37,015. Bronx surface roads, including the Yonkers and Westchester lines—operating revenues, \$1,472,270, an increase of \$518,819; net corporate income, \$54,717, an increase of \$192,906. Queens surface roads (except B. R. T.)—operating revenue, \$743,151, a decrease of \$39,706; net corporate deficit, \$32,395, a decrease of \$22,655.

Milwaukee Purchase Proposed

Electric Railway & Light Company Desires to Take Over Light, Heat & Traction Company

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has filed an application with the Wisconsin Railroad Commission for authority to purchase the equipment and business of the Milwaukee Light, Heat & Traction Company, the property of which it now operates.

HOW THE COMPANY IS CAPITALIZED

The company says in its petition that it has negotiated for the purchase of the property for \$12,271,321. It is set forth in the petition that the bonded indebtedness of the Milwaukee Light, Heat & Traction Company is \$4,921,493. The company owes the Milwaukee Electric Railway & Light Company the sum of \$4,502,167. It has outstanding in notes unpaid the sum of \$600,000. Other liabilities aggregate \$113,969. The Milwaukee Electric Railway & Light Company proposes to issue \$2,312,716 in common stock, with which to make up the purchase price of the property, the purchasing company assuming the bonded indebtedness and other liabilities of the company.

PROPERTY VALUE \$12,271,321

The valuation of the property of the Milwaukee Light, Heat & Traction Company is based on that made by the Wisconsin Railroad Commission on Jan. 1, 1914, plus \$2,100,681 spent on improvements and betterments since that date. The petition sets forth that the true value of the property to be purchased is \$12,271,321, subject to the funded debt of \$4,921,493 and the other outstanding liabilities, and the petition concludes with the prayer that the Milwaukee Electric Railway & Light Company be authorized to purchase the property at the price named and to issue additional stock to the value of \$2,312,716.

HEARING TO BE HELD SOON

The Railroad Commission will hold a hearing on the petition within a short time.

The Milwaukee Electric Railway & Light Company has also filed a petition for authority to issue \$4,000,000 of bonds for the purpose of refunding bonds soon to fall due.

Changes in Missouri Line

Several New Directors and a New Chairman of the Executive Committee Elected

The annual meeting of the Kansas City, Clay County & St. Joseph Railway, the Missouri Short Line, was held in Kansas City on Jan. 14 at which time changes in the board of directors and the executive committee were made as noted below:

Thomas A. Reynolds, formerly chairman of the executive committee, has been elected vice-president of the National City Company. He has resigned as a director of the railway and as chairman of the executive committee. Allen G. Hoyt, New York, was elected a director, and was also elected chairman of the executive committee succeeding Mr. Reynolds. C. C. Chappelle, New York, has resigned from the executive committee. William L. McKee, New York, succeeds Mr. Chappelle on the committee. Robert Maydock was elected a director of the company succeeding Clement R. Ford, Boston, Mass., who has gone to war. Others of the thirteen directors were re-elected. The officers of the company re-elected were as follows: Phillip Saltonstall, president; John R. Harrigan, vice-president and general manager; William S. Tuley, secretary and treasurer.

A Turn for the Better

Stockholders of Central California Company Assessed, but Prospects for Future are Greatly Improved

The directors of the Central California Traction Company, San Francisco, Cal., have imposed an assessment of \$5 a share on the 1,000,000 of preferred and 2,675,300 shares of common stock outstanding. This assessment, which is payable immediately, becomes delinquent on Feb. 25, with March 20 as the sale day. A letter to the shareholders says:

PROSPECTS FOR THE FUTURE

"After years of unprofitable operation, due to unjust jitney competition and other reasons, the business has taken a turn for the better. Jitneys have been regulated and an agreement between our company and its bondholders has become effective, which reduces their interest demands. Our freight tonnage alone has increased about 35 per cent over previous years. As a result, for the first eleven months of the last calendar year, instead of a loss of \$88,101 during a corresponding period in 1916, we show a profit of \$6,011. We must further increase the earnings of the company.

"The government has asked our assistance in moving freight to, and relieving traffic on, trunk lines now under its control. To do this we must increase our equipment, improve our trackage and restore our credit by paying some of the floating indebtedness. These are the reasons that have actuated the board of directors in levying the \$5 assessment."

Financial News Notes

\$2,700,000 New Cleveland Stock.—Subject to approval of the State Utilities Commission, the Cleveland (Ohio) Railway soon will offer to holders of record as of March 1, an issue of \$2,700,000 new stock at par pro rata. The right to subscribe is to expire on March 15.

Move to Dismiss Receivership Suit.—A motion has been made in the United States District Court at St. Louis, Mo., by the United Railways, that city, and other defendants looking toward the dismissal of the suit filed by J. W. Seaman, seeking a receivership for the company. The company maintains that Mr. Seaman has alleged no valid cause for naming a receiver.

New Issues for Kansas City Railways.—The Kansas City (Mo.) Railways has been authorized by the Missouri Public Service Commission to issue \$1,151,830 of additional capital stock. This amount represents the improvements which have been made since May 1, 1915. The commission has also authorized the company to refund \$6,588,400 of 5 per cent bonds with two-year gold notes bearing 6 per cent interest and dated Feb. 1, 1918.

New West Penn Power Notes.—A. B. Leach & Company, Halsey, Stuart & Company and the Continental & Commercial Trust & Savings Bank, Chicago, are forming a syndicate to underwrite a new issue of \$1,500,000 two-year 7 per cent collateral gold notes of the West Penn Power Company. The new issue is to provide funds to complete the installation of power-generating machinery at the company's new plant at Windsor, W. Va., and for other purposes.

Rights and Privileges Sold.—The trackage and rights of the old San Angelo (Tex.) Power & Street Railway Company have been sold by the city of San Angelo to the San Angelo Light & Power Company for a cash consideration of \$600. The property of the old traction company recently came into possession of the city of San Angelo under an agreed judgment of the Tom Green County District Court. The purchase secures for the new street railway of San Angelo all the trackage rights and other privileges owned by the old company.

Beech Grove Line to Be Continued.—The Beech Grove (Ind.) Traction Company, which operates an electric railway between Indianapolis and Beech Grove, has continued in business. An arrangement has been made whereby Guy Rutledge, who had been operating a line of jitney buses between the city and Beech Grove, discontinued the bus line and became superintendent of the railway. A receiver was recently appointed for the company, as noted in the ELECTRIC

RAILWAY JOURNAL of Dec. 15, and it is said that affairs are working out well under the receivership.

Springfield (Ill.) Deal Disapproved.—The Board of Public Utility Commissioners of New Jersey has denied the application of the Union Railway, Gas & Electric Company to absorb the Springfield Railway & Light Company. Both are holding corporations, chartered in New Jersey, but the interests involved are mostly in Illinois, Indiana and Wisconsin. By the terms of the application the Springfield company would cease to exist and the stock would be cancelled, and the capital of the Union company, which is \$15,000,000, would not have been increased.

Meeting Bay State Coupons.—The committee representing the holders of 4 per cent refunding bonds due in 1954 of the Boston & Northern Street Railway and the Old Colony Street Railway, controlled by the Bay State Street Railway, Boston, Mass., have completed arrangements whereby the amount due on the Jan. 1, 1918, coupons will be advanced by the depository to depositing bondholders. Although receiver's certificates have been authorized for payment of this interest the sale of these has been delayed, and it has been deemed advisable to make the foregoing arrangement.

Unprofitable Road to Be Sold.—The property of the Parkersburg & Ohio Valley Electric Railway, Parkersburg, W. Va., is to be offered for sale at auction on Feb. 28 at Parkersburg. The sale is scheduled to take place at the Federal court house at 10 a. m. V. B. Archer is the special commissioner who will conduct the sale. The road extends from Sistersville to Friendly, a distance of 5 miles. It has been doing an unprofitable business, and last December Charles E. Williams, receiver of the company, in a petition to the United States District Court at Parkersburg, recommended that the line be dismantled and its effects sold at public auction.

Proposed Reorganization Upheld.—Judge M. T. Dooling in the United States Court at San Francisco, Cal., on Jan. 24 decided against the contention of two holders of the underlying bonds of the Northern Electric Railway, Chico, Cal., that they should be allowed better terms than were accorded them by the new reorganization plan. Proceeds from the sale are planned to be distributed as follows: 16 per cent to the holders of \$6,000,000 of overlying bonds; 59 per cent to the holders of \$3,800,000 of underlying bonds on the main line; 12½ per cent to the holders of \$750,000 in bonds on the Sacramento & Woodland branch, and 12½ per cent to the holders of the \$750,000 bonds on the Marysville & Colusa branch.

Lancaster Consolidation Proposed.—Application has been filed with the Public Service Commission at Harrisburg for approval of the consolidation of seven Lancaster County electric railways into a new corporation, to be known as the Conestoga Traction Com-

pany. The companies to be merged are Lancaster Traction Company, Lancaster Railway, Lancaster City Railway, Lancaster & Lititz Railway, Columbia & Ironville Railway, Columbia & Donegal Railway and the present Conestoga Traction Company, which is a subsidiary of Lancaster County Railway & Light Company, having an authorized capital of \$1,500,000 of common stock and \$1,000,000 of 5 per cent cumulative preferred stock.

Financial Readjustment Likely.—It is reported that a new company is to be formed to take over the St. Paul (Minn.) Southern Electric Railway and to extend it after the war through southern Minnesota. The Interurban Construction Company held \$360,000 or a majority of the first mortgage bonds of the company. There are said to be \$72,000 of second mortgage bonds outstanding. Payment of interest on the first mortgage bonds was defaulted last summer. Committees of both classes of bondholders were then formed and a readjustment of the finances without the need of foreclosure now appears to be in prospect.

Changes in Lewisburg Property.—According to information just now available, the property of the Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va., was last June placed in the hands of R. M. Sell as receiver. This action followed an application to the Public Service Commission for permission to discontinue operation and abandon the line, the application being contested before the regulatory body. In the autumn certain business men in Lewisburg purchased the stock, assumed the liabilities and continued operation without the receiver. On Jan. 5, the property was sold under a trust deed held by local banks, and the same business men bought the road at a sum sufficient to cover all indebtedness.

Board Opposed to Lease Agreements.—Holding that the rental paid by the Morris County Traction Company, Morristown, N. J., to the Morris Railroad for about 2½ miles of lines between Madison and Morristown is unreasonable and inequitable, the Board of Public Utility Commissioners has refused to approve a trackage agreement entered into between the two companies on Oct. 2, 1913. The fact that this agreement had not been previously submitted to the board for approval as required by statute, was brought to light last November in the course of a hearing upon the application of the traction company for the approval of an issue of income debenture bonds. Before passing upon the proposed bond issue, the commission insisted that the company should seek approval of the trackage agreement. This was done on Dec. 5 last. The commission says that all expenses of operation should be borne directly by the traction company, if that company was to be credited with the entire amount of operating revenue, inasmuch as it would be practically impossible to determine what proportion of the gross operating revenues was assignable to the railway property.

Traffic and Transportation

General Relief Petition

Utilities of Illinois Consider Putting Their Case Before Commission in a General Application

One or two conferences have been held between the Public Utilities Commission of Illinois and representatives of important operating utilities, the result of which has been an informal understanding that the commission will entertain a blanket petition from all of the public service companies in the State asking for some sort of emergency relief because of abnormal war conditions. Should such relief be granted by the commission it is then understood that each individual case will be investigated by the commission and the justice of the new charges will be decided by that body.

It is regarded as likely that a blanket petition will be presented to the commission by the Illinois Electric Association as representing the electric light and power companies in Illinois the Illinois Electric Railway Association as representing the railways and the Illinois Gas Association as representing the Illinois gas companies. Meanwhile, applications have been filed with the commission by certain subsidiaries of the Illinois Traction Company asking for specific relief. These petitions are referred to elsewhere on this page, the names of the individual applicants and other facts being given.

APPEAL TO PUBLIC FOR SQUARE DEAL

All three of the associations mentioned previously have united in a direct newspaper appeal to the public of the State to give the utilities a fair deal in the matter of rapidly increasing costs of operation with a steady and inflexible revenue account. They point out that the utilities should be protected against losses which will ensue if they are not permitted to earn a revenue commensurate with their greatly increased operating expenses. The appeal has appeared in a number of prominent Illinois daily papers. It brings out pertinent facts with which a fair minded public should be acquainted if it is to see that the utility companies have a fair and impartial trial before the bar of public opinion.

High Water Stops Traffic

High water from the Ohio River caused the practical suspension of operation on all interurban lines in the vicinity of Cincinnati on Feb. 1. Water invaded the power station of the Interurban Railway & Terminal Company at Coney Island and the lines to New Richmond, Bethel and Lebanon were rendered idle. Service on the Cincinnati, Georgetown & Portsmouth Railway between Mount Washington and

Cincinnati was abandoned, although operation over the remainder of the line was maintained. Tracks of the Cincinnati, Lawrenceburg & Aurora Electric Street Railway were inundated in several places, but cars were kept in operation to Lawrenceburg. Aurora service was abandoned. Electric railway service in Cincinnati was interrupted, but every effort was made by the traction companies to handle passengers over the flooded points.

Another Fare Increase Allowed in Illinois

The Public Utilities Commission of Illinois has authorized a substantial increase in the fares of the Chicago & West Towns Railway, Chicago, Ill. The revised schedule was based upon a valuation of the road's property, but the usual careful field check was dispensed with. The evidence showed that the road was in the hands of a receiver, had never paid dividends, that the interest on the funded debt and receiver's certificates had not been met, and that there was little chance for the road earning a fair return upon any sum approximating a reasonable value. The order says, in part:

"From the foregoing it seems clear that petitioner has for many years furnished service to these communities without an adequate return upon its investment. To such a return it undoubtedly has right, and it seems only fair that opportunity be given petitioner to earn increased revenues by means of increasing the rates to be charged for its services."

The increased cost of material and supplies and of wages was considered in fixing the increased rates.

Advance in Class Rates

The Interstate Commerce Commission has ordered that the rates as specified in the recent application of the Cincinnati, Georgetown & Portsmouth Railroad, Cincinnati, Ohio; Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind., and Fort Wayne & Decatur Traction Company, Decatur, Ind., be approved for filing without formal hearing. The companies petitioned the commission to approve the filing of class and commodity rates similar to the present effective steam railroad rates in the same territory for like distances which were established in conformity with the previous decision of the commission. This the commission approved on the ground that the rates proposed for the electric lines would result in a greater uniformity of charges in the territory affected. It is said that the new tariff for the electric railways means an advance in general of about 15 per cent.

I. T. S. Seeks Increases

Railway, Light and Power, and Gas Companies All Apply for Permission to Advance Charges

An increase in the rates for city railway service, as well as for electric lighting and gas service, is asked for in a petition filed by thirteen subsidiary companies of the Illinois Traction System, Peoria, Ill. The bill was presented to the Public Utility Commission of Illinois on Jan. 31. Henry I. Green, Urbana, Ill., counsel for the companies, filed the bill. A straight 5-cent fare is asked in every community served by railways except Jacksonville and Cairo, where a 6-cent rate is asked. The elimination of all coupon books and quantity sale of tickets at reduced rates is also included in the bill. The increase in electric lighting service proposed is from 6 to 20 per cent, depending upon the community, while an increase of from 5 to 25 cents per 1000 cu. ft in gas rates is asked.

THE THIRTEEN APPLICANTS

The companies uniting in the bill are the Peoria Railway, the Quincy Railway, the Urbana & Champaign Railway, Gas & Electric Company, the Urbana Light, Heat & Power Company, the Clinton Gas & Electric Company, the Cairo Electric & Traction Company, the Bloomington & Normal Railway & Light Company, the Danville Street Railway & Light Company, the Decatur Railway & Light Company, the Jacksonville Railway & Light Company, the Galesburg Railway, Lighting & Power Company, the Northern Illinois Light & Traction Company, Ottawa, and the Madison County Light & Power Company, Edwardsville.

EMERGENCY INCREASE ASKED

The petition recites that owing to the present abnormal conditions caused by the war the companies are in need of immediate relief in the form of increased rates for all public utility service rendered. The companies request further that the commission grant the emergency increase at the present time with a hearing at the discretion of the commission at a later date, when the local conditions affecting each company will be taken up. The companies agree to abide by the decision of the commission, and if any of the proposed rates are found unjustified they agree to make rebates to the consumers. Separate schedules are filed in the case of each company.

HEARING SET FOR FEB. 19

The commission has set Feb. 19 as the date for the hearing upon the petitions filed by the thirteen companies previously mentioned for an increase in rates.

After a full hearing in the case of the Danville Street Railway & Light Company, Danville, the commission has issued an order permitting the company to eliminate ticket fares. Heretofore eleven tickets were issued for 50 cents by the Danville company, or 100 tickets for \$4.

Failure of Service in Waterbury

Connecticut Commission Sounds Note of Warning—Commission and Public Expect Results Despite Unfavorable Conditions

As a result of its inquiry in the service furnished by the Connecticut Company in Waterbury the Public Utilities Commission has issued the following order:

"The Connecticut Company is hereby ordered and directed to furnish and provide at least forty cars suitable for winter service in and for electric railway service in the city of Waterbury and its suburban lines, on or before Feb. 5, 1918, and to furnish and provide eight additional cars for such service on or before Feb. 12, 1918, and within fifteen days thereafter to furnish and provide at least an additional 20 per cent of the number of cars hereby required, to insure reasonably adequate electric railway facilities for said service.

"The Connecticut Company is further ordered and directed on and after March 1, 1918, to maintain at least fifty-eight cars in good serviceable condition for said service."

In its finding the commission said:

"On Jan. 23, 25 and 26 a member of this commission was in Waterbury, examining into service conditions of the Connecticut Company. On Jan. 28 the Aldermanic committee of the city of Waterbury held an informal conference with the commission, relative to the Connecticut Company service in that city. During the last few days the commission has written to and had interviews with officials of said company, pertaining to said service.

SERVICE COLLAPSE

"From all of the foregoing it appears and is found that there has been a general breaking down—in fact, almost a collapse, of the electric railway service in Waterbury during the last week, and that the partial service now being rendered is wholly inadequate to the public need.

"Ordinary service conditions in Waterbury require at least twenty-four cars in commission during normal service hours and at least forty-eight cars in commission during the so-called rush hours. The maximum number of cars in commission during some of the days of the last week, including rush hours, did not exceed fourteen.

"The inadequacy of service is due to lack of proper maintenance of cars and equipment and lack of sufficient cars in serviceable condition for operation. We further find that the Connecticut Company has sufficient cars capable of being put into serviceable condition for winter use in the city of Waterbury.

"Owing to the condition which the Connecticut Company has permitted its plant and equipment to arrive at in Waterbury, and owing to the imperative demands for immediate relief, we deem it advisable to issue an order based on the facts already familiar to the commission, without the delay of formal petition and public hearing. We therefore ask the Connecticut Company to waive any informality and to accept the

finding as an official and binding order of this commission, and immediately after receipt thereof to notify this commission of its acceptance."

COMPANY HELD RESPONSIBLE

The letter of the commission to the company read in part as follows:

"Unusual conditions require unusual, special and even drastic efforts and remedies to meet them successfully. In this crisis of corporate and national emergency, an added duty and obligation rests upon your company, an obligation which is not met in the ordinary slow routine of applying the usual remedies, but by the prompt exercise of every possible and extraordinary means that may be used to correct the situation and prevent a similar recurrence at Waterbury or elsewhere in your territory.

"It appears from what information this commission has at hand, that the present principal difficulty in Waterbury is a general breaking down of the rolling stock, motors, etc., and the imperfect condition of roadbed (due largely to winter storms) for successful operation. This is a condition that proper care and maintenance would have large-

ly if not wholly prevented, and under ordinary circumstances would be entirely inexcusable.

"A person or corporation undertaking to do business at the present time, under the abnormal conditions, must be prepared to meet these conditions and compete with all adverse circumstances. This is particularly true of a utility company, especially when such company has had no financial handicaps placed upon it by public regulation.

"Our commission is very much disturbed over what has happened in Waterbury and what may happen in Bridgeport and other populous centers unless immediate and extraordinary remedies are applied. We insist upon and shall expect the Connecticut Company to use every means within its power promptly to restore at least normal service in Waterbury, to safeguard and improve its service generally, and to be so prepared to meet the abnormal conditions and demands as to prevent elsewhere any such breakdown as now exists in Waterbury.

"We realize the difficulties confronting the company and say what we have said in a friendly but authoritative manner and will be glad to co-operate or counsel with you if you desire, bearing in mind the familiar adage, 'Action speaks louder than words,' and that results are what our commission and the public have every reason to expect."

North Carolina Roads Need More Revenue

Informal Conference to Consider How Best to Secure Increased Revenues—Publicity to Play Its Part

Representatives of the electric railways in North Carolina met at Greensboro on Jan. 24 on call of Robert Lee Lindsay, vice-president and general manager of the Durham Traction Company, and spent the entire day considering ways and means of increasing the revenues. That the revenues need to be increased at the very earliest possible moment was agreed, but the manner of accomplishing this was the question which received the most serious consideration.

The conference was an informal one, but for the purpose of proceeding in an orderly manner Mr. Lindsay was elected chairman and Leake Carraway, director of publicity for the Southern Public Utilities Company, Charlotte, secretary. The representatives of each railway in attendance spoke of conditions prevailing in his city and pointed out the necessity for increased revenues.

RATES RAISED IN GREENSBORO

Charles B. Hole, president of the North Carolina Public Service Company, with headquarters at Greensboro, reported that he had placed the real situation frankly before the commissioners of his city, and that the commissioners had voted to allow the railway to withdraw from sale all reduced-rate or special-rate tickets, despite the fact that the franchise of the company specified that certain special-

rate tickets must be furnished by the company. He had proved that unless the rules requiring the sale of tickets were rescinded the company would continue to lose money. It was President Hole's opinion that when a railway went to the law-making body of a city with clean hands and showed the necessity for relief, there would be no difficulty in securing that relief. Mr. Hole advertised in the daily press the real situation that confronted the railway, and the people offered no objection to the action of the commissioners in allowing the withdrawal of special rates. He estimated that the withdrawal of the special-rate tickets would at least make it possible for the company to break even. The flat fare for Greensboro was referred to previously in the *ELECTRIC RAILWAY JOURNAL* for Jan. 19, page 158.

Mr. Lindsay reported that no special rates were in effect at Durham, but that his company was considering the advisability of making a charge for transfers. He admitted, however, that the layout of his system was such as to raise some doubt about the advisability of this procedure.

H. H. Carr, vice-president and general manager of the Carolina Light & Power Company, Raleigh, expressed the opinion that immediate relief was necessary and that, while a publicity campaign to acquaint the people with the

facts might be a good thing, railways in general could not wait the result of such procedure before asking for relief. He urged that the entire matter be laid before the State Corporation Commission at the earliest possible moment, with a request for some ruling which would prevent the further loss of money.

It was finally determined, however, to begin at once for the entire State a systematic campaign of educational publicity similar to that conducted by the Southern Public Utilities Company for the last three years. An arrangement was made for exchange of advertising matter between companies.

I. T. S. Flat Fare

On Feb. 11 Company Will Place in Effect Recently Allowed Two-Cent Rate

The new passenger tariffs recently approved by the Public Utilities Commission of Illinois will be inaugurated by the Illinois Traction System on its electric railway lines on Feb. 11.

The tariffs, which have been filed, provide for basing ticket fares at 2 cents per mile, and the discarding of the former 5-cent zone system. In its application to the commission the company showed that the new method of basing passenger fares would not increase the revenue and that all fares would be practically the same as at present, except that the change would remove certain discriminations established by the old zone system of collection.

Under the new tariffs the company is also authorized to collect 2½ cents per mile from passengers who pay a cash fare aboard the train, where they board the train at an open agency station. This is the same rule observed by steam railways, except that their cash fare charge is 3 cents per mile. The company anticipates that this rule will encourage buying of tickets at the stations and thereby greatly relieve conductors, who are now especially burdened because of war tax collections required on all cash fares. For the convenience of passengers whose destinations is a regular crossroads stop the company will place a new form of ticket in all agency stations.

Will Appeal Portland Case

The city attorney of Portland, Ore., will appeal to the courts from the recent order of the Public Service Commission, granting the Portland Railway, Light & Power Company the right to charge a 6-cent fare. Commissioner Kellaher introduced a resolution in the City Council, asking permission to engage another attorney to assist in the case, and setting forth that "there exists among the citizens of Portland a fixed belief that the action of the Public Service Commission is antagonistic to the interests of the citizens, and permits the company to violate its contract obligations, and is illegal and void."

Efforts Bent Toward Relieving Buffalo Traffic

More Intensive Use of Belt Line, Electrification of That Line in Immediate Future and Construction of Subways Urged

Immediate construction of a system of subway terminals in the congested business section of Buffalo, N. Y., is recommended by the municipal traffic board appointed by the Mayor to investigate the electric railway problem. Plans for the proposed subways and subway terminals have been prepared by the city engineer and the recommendations have the approval of the new street railway commission and members of the City Council.

John C. Brackenridge, who has been engaged by the municipal authorities to investigate traffic conditions on local lines of the International Railway, has been asked to consider the proposed subway plans and to report as quickly as possible to the Council. It is proposed that the subways be constructed by the city and leased to the International Railway at a figure which would carry the interest charges and eventually retire the bonds.

TWO SHORT SUBWAYS SUGGESTED

Two short subway systems have been suggested with loading terminals at Lafayette Square and Niagara Square in the heart of the retail shopping district. Cars would enter the subway on the east side of Main Street at a point about four blocks from Main Street and would continue through the subway to a point about four blocks west of Main Street. Loops would be constructed under Lafayette Square and Niagara Square and loading terminals would be built at these points. All eastbound and westbound surface tracks would be removed in the downtown section and the only tracks would be north and south. Thomas Penney, vice-president and general counsel of the International Railway, is a member of the municipal traffic board which presented the plans for the proposed subway.

In addition to making this recommendation, the board criticized the general layout of the company's lines. It said that the haphazard connection of lines at the time competing companies were absorbed in Buffalo was partly to blame for the present traffic situation. The general revision of electric railway trackage throughout the city is recommended.

The recommendations of the municipal traffic board are separate from the investigation of the electric railway problem now being made by Mayor George S. Buck and the municipal railway committee under the direction of Mr. Brackenridge. At the last meeting of the railway committee, the city attorney was directed to inquire into the procedure necessary to bring an action in the Supreme Court of Erie County to abrogate the franchise of the International Railway. In addition Mr. Brackenridge was instructed to find out what orders and recommendations of the Public Service Commission had been ignored by the railway.

In another report to the City Council on traffic questions Mr. Brackenridge said that the police department should make every effort to stop the wrecking of cars at industrial plants. He pointed to two specific instances where windows were broken and rolling stock otherwise damaged by passengers who were unable to board cars at the Pierce-Arrow Motor Company plant.

ELECTRIFICATION OF BELT LINE URGED

Electrification of the double-track steam belt line service around Buffalo is recommended by Mayor Buck. Several conferences have already been held by the Mayor with officials of the New York Central Railroad in regards to the electrification of the belt line service but no agreement has been reached. The Chamber of Commerce has sent an appeal to Director General of Railroads McAdoo urging him to require the New York Central Railroad Company to put on additional trains to carry workers to and from the large war industries in the district that is served by the company.

In replying to charges made by the Mayor, E. J. Dickson, vice-president of the International Railway, sent a long statement to the municipal railway commission showing how the company was making every effort to handle the transportation problem resulting from recent severe snow storms and the loss of forty-seven cars in the Forest Avenue carhouse fire. In his statement Mr. Dickson said:

"While the number of crippled cars is still large, we installed 244 pairs of wheels during the week ending Jan. 25; 322 armatures and 847 fields. In addition we have extra men inspecting motors, controllers, truck brakes and car bodies. All worn parts are being rapidly replaced. Many cars are out of service due to car-door failures, but we are now inclosing door mechanism with canvas shields. We have also had a large number of failures from broken journals and truck parts which were due to an accumulation of ice outside of the rails."

TYPES OF CARS DESTROYED

In explaining the types of equipment destroyed in the Forest Avenue carhouse, Mr. Dickson said that twenty-five cars were of the double-end type, the heaviest cars operated by the company on its city lines; eighteen were of the near-side pay-as-you-enter type and three were of a small size double-end type. Two large snowplows, two track sweepers and one work car were also destroyed. Mr. Dickson told the committee he did not believe it would be practicable to operate open cars because of the extreme cold weather. The members of the committee were assured by Mr. Dickson that they would be kept informed weekly of the condition of the company's equipment.

Meeting an Emergency

Open Cars to Be Operated for Ship Works As a Means of Immediate Relief

The Public Service Commission for the First District of New York, on the application of Capt. C. S. Bookwalter, district officer of the United States Shipping Board, has issued permission to the Richmond Light & Railroad Company to operate open cars for the transportation of shipbuilding workers from St. George, S. I., to the shipbuilding plants on the north shore of Richmond. The company has all of its other equipment in use, and in view of the present emergency the commission agreed to permit the operation of the open cars for the transportation of the thousands of ship workers. The full regular equipment of the company will be left in service for the conveyance of the regular passenger traffic of the line and efforts will be made to restrict the use of the open cars solely to the shipbuilders. The commission gave its approval on motion of Commissioners Charles Bulkley Hubbell, after ex-Justice William L. Ransom, counsel to the commission, had stated that the company did not have sufficient closed cars to meet the abnormal demand.

Puts Song into His Work

Minneapolis Has a Ragtime Conductor Who Has Set the City to Singing His Rhymes

The left gate in; the right gate out,
And you've really nothing to worry about.

Thus blithely caroled "No. 1260," ragtime conductor on the Chicago and Fremont line. Not alone is "1260" urbane, polite and watchful, but he is entertaining. Women with fretful children wait for him; tired business men greet him with a smile and young girls chew their gum blissfully and try to remember his rhymes. Commonplace is discarded by the rhythmic "1260," for he is the true poet, seeking to scatter bits of happy and timely roundelay as a part of his daily toil.

The car approaches a transfer point:
Ladies and gents, this is the time
To change cars here for the Hennepin line
suggests "1260." Some one lagged a bit getting aboard:

Come on, good folks—don't be slow,
Hop on the car—come on—let's go,
is his admonition.

As the Chicago avenue curve is approaching, comes then the caution:

A curve is coming—to prevent mishap,
All those standing—grab a strap.

An old lady stood in the aisle, and near her a young mother with a child; "1260" threw a sharp glance in her direction, thought a second, and sang:

The gents will stand and the ladies sit down,
And we'll all be polite in this man's town.

Starting through the car, the happy "1260" reminded:

The conductor is coming to get your fare,
A nickel is needed—a dime for a pair.

Take one trip with ragtime "1260" and you'll always wait for his car. "Some" conductor—"some" songster. —Minneapolis News.

Transportation News Notes

Skip-Stop Trial in Des Moines.—The Des Moines (Iowa) City Railway is giving the skip-stop plan a month's tryout on its University line.

One-Man Cars for Short Seattle Line.—The Seattle & Rainier Valley Railway, Seattle, Wash., has petitioned the City Council for permission to operate six reconstructed one-man cars. The petition has been referred to the public utilities committee.

Will Eliminate One Hundred Stops.—City Commissioner William Burk, of Trenton, N. J., and City Engineer Abram Swan have been selected by the City Commission to pass judgment upon the list of 100 stops the Trenton & Mercer County Traction Corporation intends eliminating to increase further the efficiency of its local service in the city of Trenton.

Metal Tickets for Dallas.—Metal tickets to be used by the Dallas (Tex.) Railways have been received by the company. They will be used as soon as the new cash fare boxes can be installed. The company received metal discs of three sizes, one for the regular tickets now sold at twenty-two for \$1, one for the half-fare students' tickets and one for the regular half fare tickets for children under twelve years of age.

Accident in Champaign.—A car of the Illinois Traction System which stalled on the University Avenue crossing of the Illinois Central Railroad, Champaign, Ill., was struck in the center by a freight train, pushed over the crossing and turned upon its side. All but two of the nine passengers were on the south side of the car, and to this is attributed the fact that there were no fatalities. Two men were seriously but not dangerously hurt.

Increase Asked by Marion Company.—The Marion & Bluffton Traction Company, Bluffton, Ind., has filed a petition with the Public Service Commission of Indiana asking authority to increase its rates for passenger fares from 2 cents a mile to 2½ cents a mile. The company has also asked authority to discount the round-trip fare to the extent of 5 per cent of the total charge of the fare both ways. It would charge 2 cents a mile for commutation books under this petition.

No Unrestricted Jitneys in Portland.—The City Council of Portland, Ore., on Jan. 23 agreed to support a proposal to submit the question of the operation of jitneys in Portland to a vote of the people at a special election in April. This action was taken after Commissioner Kellaher had received no support from the Council in his move to turn the jit-

neys loose at once, free of all regulation, as a result of the recent action of the Portland Railway, Light & Power Company in raising the city fare to 6 cents.

Crosstown Service Abandoned.—The Des Moines (Iowa) City Railway has abandoned crosstown service. For several years the company maintained crosstown service east and west. Delays in the service and the proposed rebuilding of lines this spring caused R. G. Smock, city railway supervisor, to recommend to the officials of the company that the crosstown service be eliminated. Lines are now operating individually on the Fair Grounds-Douglas Avenue and the Ingersoll-Valley Junction routes.

Free or Donation Buses Allowed.—According to an ordinance passed by the City Council of Tacoma, Wash., recently, free or donation buses will be allowed to operate in that city. The ordinance provides that all operators of the free or donation jitneys shall take out permits from the city clerk's office, and shall keep on file a bond of \$2,500. No fare is fixed, patrons or the buses donating whatever they please. The ordinance defining and regulating the new form of transportation in Tacoma was introduced by Mayor A. V. Fawcett. The measure received the unanimous vote of the Council.

Something a Little Different.—The uniform of the women employed on the cars of the Manhattan & Queens Traction Corporation, Long Island City, N. Y., is of navy blue cloth with a distinctly military cut, resembling the dress uniform coat of the Marine Corps though without the brass buttons. The collar is ornamented by gold initial letters of the company. There is a military cap and skirt to match the coat. The skirt is short enough to permit quick movements. Most of the other surface and tunnel lines are affecting a khaki uniform with wrap leggings for the young woman conductor or guard.

Increase in Fares for Washington Buses.—After careful consideration of the suggestions submitted in writing and of all the testimony adduced at a public hearing in regard to the operation of motor vehicles in Washington, D. C., the Public Utilities Commission of the District recently decided: "First, that the rate of fare to be charged by the operators of such motor vehicles should be increased; second, that this increased rate should apply within a definite area approximating that embraced within a radius of 4 miles from the White House; third, that an additional fare should be authorized to points outside of said area; fourth, that so much of Order No. 224 relating to the use of certain streets in the congested business area be amended so as to permit the streets mentioned therein to be used by motor vehicles during the hours of non-rush traffic on the electric railway lines." The commission entered an order on Jan. 2 in accordance with the finding at which it arrived.

Personal Mention

O. P. Chubbuck, superintendent of shops of the Illinois Traction System at Decatur, has resigned.

James A. Connell has been appointed auditor of the Albany (N. Y.) Southern Railroad, to succeed T. H. Blaikie.

J. S. Murphy has been appointed superintendent of the power station of the Ithaca (N. Y.) Traction Corporation to succeed C. B. Hudson.

H. F. Vokes has been appointed chief engineer of the Auburn & Syracuse Electric Railroad, Auburn, N. Y., to succeed D. E. Crouse.

Robert S. Tomkins has been appointed assistant treasurer of the Public Service Railway, Newark, N. J., to succeed Robert D. Miller, deceased.

Edward Fitzgerald has been appointed roadmaster of the Central New York Southern Railroad Corporation, Ithaca, N. Y., to succeed J. J. Welch.

George Baker, formerly general superintendent of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., has been appointed assistant general manager of the company.

Seymour Van Santvoord, Troy, chairman of the Public Service Commission for the Second District of New York, retired from the commission on Feb. 1 by virtue of the expiration of his term.

J. R. Savage has been promoted from the position of chief engineer of the Long Island Railroad, New York, N. Y., and subsidiary companies to that of general manager, to succeed J. A. McCrea.

L. V. Morris has been appointed chief engineer of the Long Island Railroad, New York, N. Y., and subsidiary companies to succeed J. R. Savage, who has been appointed general manager of the company.

Weldon F. Weston has been elected first vice-president of the Mount Beacon-on-Hudson Association, which operates a cable incline railway to the top of Mount Beacon, N. Y. He succeeds Albert Merrill.

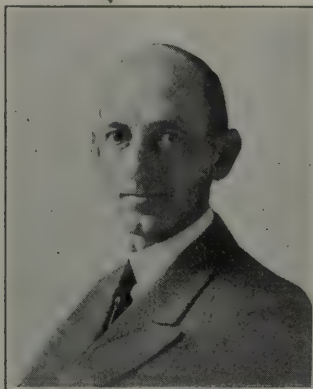
M. H. Aylesworth, a member of the Public Utilities Commission of Colorado, has been appointed assistant to S. R. Inch, the newly-elected vice-president of the Utah Light & Power Company, Salt Lake City.

James Harmon has been appointed safety manager for the Kentucky Utilities Company, the Interstate Public Service Company and other adjacent Middle West Utilities Company properties, with offices in Louisville, Ky.

Thomas F. Fennell, Elmira, has been named by Governor Whitman to succeed Seymour Van Santvoord as chairman of the Public Service Commission of the Second District of New York. He is now a Court of Claims judge.

Franklin T. Griffith, president of the Portland Railway, Light & Power Company, Portland, Ore., has been selected for the position of State Director of the United States Public Service Reserve, by I. W. Litchfield, associate director of the service.

W. C. Swisher, supervisor of safety of the Denver (Col.) Tramway, has resigned to assume the position of general claims attorney for the Kansas City (Mo.) Railways. He has been an employee of the tramway since June, 1910, and the work of his department has been very effectively handled under his direction. Mr. Swisher was born at New Madison, Ohio, in 1878. After he was graduated from the University



W. C. SWISHER

of Michigan in 1900, Mr. Swisher went to Colorado and began the practice of law in Victor. The following year he became connected with the Rock Island Railroad. He served in the office of the general claims attorney at Chicago, and two years later was transferred to Santa Fe. He was later appointed claim agent for the Texas lines, with headquarters at Amarillo, where he remained until September, 1909. Upon his departure from the Denver Tramway, officials of the company presented Mr. Swisher with a wrist watch as an expression of the good fellowship which has always existed between Mr. Swisher and his associates there.

Sydney L. Wright, president of the New Jersey & Pennsylvania Traction Company, Trenton, N. J., which controls the Trenton, Lawrenceville & Princeton Railroad, has been elected president of that company to succeed W. R. Wright.

J. D. Barnhart, formerly master mechanic at the Granite City shops of the Illinois Traction System, has been appointed superintendent of shops of that company at Decatur, in charge of repairs to all interurban equipment, succeeding O. P. Chubbuck.

Emil G. Schmidt, president of the Des Moines (Iowa) City Railway and the Interurban Railway, Des Moines, has been made vice-president of the German-American Patriotic Association, organized at Des Moines by the Iowa State Council of Defense.

Joseph W. Folk has sent to the Interstate Commerce Commission his resignation as the commission's chief counsel, to take effect before Feb. 15. Mr. Folk will return to his home in St. Louis to become general counsel of the Chamber of Commerce there.

A. F. Smith has been appointed engineer of maintenance of way of the Lehigh Valley Transit Company, Allentown, Pa., and the Phillipsburg (N. J.) Transit Company and the Easton (Pa.) Transit Company, subsidiary companies, to succeed Charles E. Jenkins.

George W. Strack, Jr., who has been a member of the bureau of safety's force of the Middle West Public Utilities Company, Chicago, Ill., for four years, has been made safety agent for the Central Illinois Public Service Company, controlled by the Middle West company.

Robert Tillman Johnson, inspector in charge of transportation of the Owensboro (Ky.) City Railway, has been appointed superintendent of the company. He succeeds G. Raymond Milligan, who has been made superintendent of the properties of the Evansville (Ind.) Railways.

Roy Crandall, publicity agent for the Buffalo (N. Y.) General Electric Company, has been appointed advertising agent for the International Railway, Buffalo. This is a new position created by E. G. Connette, president of the company. Mr. Crandall will continue with the Buffalo General Electric Company. He was formerly engaged in newspaper work.

W. E. Titus, whose appointment as superintendent of the Easton (Pa.) Transit Company was noted in the ELECTRIC RAILWAY JOURNAL for Dec. 1, 1917, will act in a similar capacity with the Phillipsburg (N. J.) Transit Company, both companies being controlled by the Lehigh Valley Transit Company, Allentown, Pa. Mr. Titus succeeds H. H. Patterson with both companies.

George H. Losey, assistant general superintendent and electrical engineer for the Indiana Railways & Light Company, Kokomo, Ind., has resigned to become connected with the Great American Refining Company at Tulsa, Okla. Mr. Losey has been with the Kokomo company for the last ten years in various engineering capacities. He started in the meter department and advanced through a line of promotions. He was graduated in the electrical engineering course at Purdue University.

R. W. Tassie, who has been assistant electrical engineer of the Havana Electric Railway, Light & Power Company, Havana, Cuba, has been promoted to the position of electrical engineer, succeeding C. H. Sanderson. In his present position Mr. Tassie has charge of the electrical and commercial engineer-

ing work of the company. During the last six years, since he went to Havana, he has occupied several positions with the company leading logically to his present one. Mr. Tassie, who is a native of Australia, came to this country to study electrical engineering and graduated in the course in this subject at Cornell University in 1909. In his senior year he was elected to the Sigma Xi Society, an indication of his ability in scientific work, and he was very active in the Cosmopolitan Club, which is a powerful organization at Cornell. He has also recently been transferred to the grade of member in the American Institute of Electrical Engineers.

Obituary

Richard L. Jennings, a former superintendent of the old Brooklyn City Railroad, now included in the Brooklyn Rapid Transit System, is dead. He was latterly in the real estate business, but had been retired for some years. Mr. Jennings was born in Iowa eighty-six years ago. He entered railroad work in Brooklyn more than sixty years ago. He is said to have sent the first car out under electrical power in Brooklyn. Altogether, Mr. Jennings was connected with railroading for forty-five years. He was a Civil War veteran.

William Temple Emmet, a member of the Public Service Commission of the Second District of New York since March, 1914, died on Feb. 4. He was State Superintendent of Insurance for two years, beginning in February of 1912. Mr. Emmet was born in New Rochelle in 1869, was educated at St. Paul's School, Concord, N. H., and at Columbia University. He was admitted to the bar in 1891. He practiced in New Rochelle for several years and then opened an office in New York. He was active in politics both in and out of Tammany Hall for a number of years, but was defeated for the State Senate from the Bronx in 1903.

Fernand de Tranaltes, assistant engineer of construction of the New York (N. Y.) Railways, is dead. Mr. Tranaltes was forty-nine years old. He was graduated at Cooper Union with honors and began active service as leveller on the Union Pacific Railroad, later returning to New York to engage as engineer with the contracting firm of J. D. & T. E. Crimmins. In August of 1890 Mr. Tranaltes began on the preliminary surveys for the Broadway cable road and continued in the engineering corps of the railway during the construction of Broadway, Columbus Avenue and Lexington Avenue cable roads until about 1895, when he was recommended by the president of the railway to put through the construction of the electric railways on Staten Island. After completion of this work Mr. Tranaltes resumed work with the railway engineer corps of the New York Railways on construction.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Franchises

Tulsa, Okla.—Because of the opposition of First Street property owners to the construction of an interurban line on that thoroughfare, the Mayor and Board of City Commissioners refused to take any definite action in the matter of granting or denying the request of the Oklahoma Union Railway for a franchise through the city for the Sapulpa-Collinsville line. The board is willing to submit the matter to a vote of the people. In that case a decision will be rendered at either the primary or city election, both of which are held in April.

Chester, Pa.—Application has been made to the City Council of Chester by the Chester & Philadelphia Railway for permission to lay additional tracks on Crosby and Fourth Streets to relieve the traffic congestion which exists on the line between Chester and Philadelphia.

Track and Roadway

Arkansas Northwestern Railroad, Bentonville, Ark.—The Benton Chancery Court has issued an order directing the Arkansas Northwestern Railroad to remove its tracks and ties in Bentonville. Operation was suspended on this line some time ago.

Pacific Electric Railway, Los Angeles, Cal.—Surveys have been begun by the Pacific Electric Railway for an extension to connect the line from South Los Angeles with the line to El Segundo.

Connecticut Company, New Haven, Conn.—Plans are being considered by the Connecticut Company for the extension of its Dixwell Avenue line in Hamden.

***Macon, Ga.**—It is reported that government engineers are surveying along the right-of-way of the old Macon & Augusta Railroad to Camp Wheeler, about 5 miles.

Peoria & Chillicothe Electric Railway, Peoria, Ill.—At the annual meeting of the Peoria & Chillicothe Electric Railway held recently, assurance was given by officials of the company that the line between Peoria and Chillicothe will be built as soon as steel and materials can be purchased. E. A. Mitchell, Chillicothe, was re-elected president; John F. Lynch, vice-president; W. E. Emery, secretary; A. H. Black, assistant secretary, and E. A. Mitchell, treasurer. [April 28, '17.]

Des Moines (Iowa) City Railway.—The 1918 extensions to be made by the Des Moines City Railway were recently decided upon at a conference between the city engineer, the city car supervisor and W. L. Wilson, engineer maintenance of way of the company, as follows: The Crocker Street line will be extended on Twenty-fourth Street from Ingersoll Avenue to Center Street; on Center from Twenty-fourth to Thirty-first, on Thirty-first from Center Street to Crocker Street, on Crocker Street from Thirty-first to Forty-seventh Street. The Walker Street line will be extended from East Twenty-fourth Street to Twenty-ninth Street. The Euclid Avenue line will be extended on Second Street to Amherst Street, on Amherst from Euclid Avenue to Hull Avenue, on Hull Avenue to East Ninth.

Inter Urban Railway, Des Moines, Iowa.—Construction has just been completed of an additional mile of double track by the Inter Urban Railway on its Camp Dodge line. There remain but 3 miles of construction to make the entire line to Camp Dodge double-tracked.

Ware & Brookfield Street Railway, Ware, Mass.—J. Edward Brooks, president of the Ware & Brookfield Street Railway, ordered the discontinuance of operation on the Gilbertville and West Brookfield divisions on Feb. 3, as the line has been a losing proposition.

St. Paul Southern Electric Railway, St. Paul, Minn.—If the tentative plan for the reorganization of the St. Paul Southern Electric Railway goes through the likelihood is that the road will be extended through Southern Minnesota.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The City Commission has requested the Trenton & Mercer County Traction Corporation to remove its feed wires and cables running from the power house on Lincoln Avenue to North Clinton Avenue and install them underground. The commission asks that the work be done as soon as the weather permits.

Batavia (N. Y.) Traction Company.—It is reported that the Batavia Traction Company is considering the extension of its line to Horseshoe Lake.

Brooklyn (N. Y.) Rapid Transit Company.—At the direction of Borough President Maurice E. Connolly, work has begun on the completion of plans for the extension of a crosstown trolley line from the Williamsburg Bridge plaza in Brooklyn to the Queensboro Bridge plaza in Long Island City. In the preparation of these plans he has directed that consultation be had with the officials of the Brooklyn Rapid Transit Company and of the Manhattan & Queens Traction Company, both of which may join in the operation of the line if it is built. As soon as the plans

are completed application will be made to the Board of Estimate and the Public Service Commission for a franchise. It is proposed that the line start at the Williamsburg Bridge plaza and extend to Driggs Avenue, to Manhattan Avenue, to Greenpoint Avenue and here cross the Blissville Bridge to Van Dam Street, and through Van Dam Street to the Queensboro Bridge plaza.

Pittsburgh (Pa.) Railways.—An order was made in Common Pleas Court on Feb. 1 requiring the Pittsburgh Railways to remove its tracks and trolley poles from two lots owned by it on California Avenue, and an injunction was issued restraining the company forever from placing tracks, poles or buildings within 40 ft. of California Avenue.

Columbia (S. C.) Railway & Navigation Company.—This company has completed a survey for its contemplated interurban railway from Columbia, via Lexington and Saluda, to Greenwood, S. C., about 75 miles, but construction is deferred.

Dallas (Tex.) Railway.—Rails are en route to Dallas in sufficient quantity to allow for the extension of the Second Avenue and of the Colonial Avenue railway lines of the Dallas Railway. These extensions have been approved by the city and are expected to be the first the company will make under its new status with the city. The date of the arrival of these shipments, however, is problematical under the present condition of transportation lines. It is proposed to double-track Second Avenue from Parry Avenue to the city limits and to double-track Colonial Avenue, where the double-track now ends, to the city limits. All of the trolley wire on its Oak Cliff line is being replaced by new wire.

Houston (Tex.) Municipal Railway.—It is reported that the Houston Municipal Railway will build a 60-ft. plate girder bridge, 400 lin. ft. of standard trestle and 1000 lin. ft. of temporary trestle in connection with its proposed 4-mile line from a connection with the International & Great Northern Railroad to the plant of the Sinclair Gulf & Refinery Company. R. E. Sands, city engineer. [Jan. 26, '18.]

San Angelo Power & Street Railway, San Angelo, Tex.—The property of the San Angelo Power & Street Railway has been sold by the city of San Angelo to the San Angelo Light & Power Company. It is expected that the line will be placed in operation during this year.

San Antonio, San Jose & Medina Valley Interurban Railway, San Antonio, Tex.—The operation of electric cars has been temporarily discontinued by the San Antonio, San Jose & Medina Valley Interurban Railway, which operates a line between San Antonio and San Jose, and the company is operating automobiles until it can arrange finances for rebuilding the track and equipment.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—A large delegation of citizens of West Seattle recently appealed to the City Council

for better car service, with the suggestion of the construction of a railway line on Avalon Way, shortening the route of the Fauntleroy line, and cutting out a number of stopover switches. Several years ago, the Council granted the Puget Sound Traction, Light & Power Company a franchise on Avalon Way. This was vetoed by Mayor Coterill, who was in office at that time. A second application was withdrawn by the company when Youngstown citizens filed objections. The situation has now changed so that the line can be built without interfering with Youngstown service. The delegation stated that the company has agreed to build the extension, if a franchise can be secured.

Seattle, (Wash.) Municipal Railway.—It is expected that operation of the Seattle Municipal Railway, Division A, into Ballard, over the Fifteenth Avenue N. W. bridge, will be begun during this month. Upon the opening of this extension municipal cars will be operated on Fourth Avenue as far as the County-City Building at Jefferson Street, by common-user agreement with the Seattle & Rainier Valley Railway. Because of the light construction of the Loyal Heights Electric Railway, which has been taken over by the city, it will be impossible to operate the city's large cars over that line, so that between the County-City Building and the north terminus at Thirty-second Avenue N. W. and West Eighty-fifth Street there will be a transfer of passengers to and from large and small cars at West Sixty-seventh Street and Twenty-second Avenue N. W.

Puget Sound Electric Railway, Tacoma, Wash.—On the Tacoma-Puyallup Short Line of the Puget Sound Electric Railway the damage done by recent floods and washouts was so serious that it may cause either rebuilding or abandoning the line. When the Short Line was built the company constructed breakwaters and strengthened the river banks to protect the interurban bridge near Tacoma. Pierce County later put through some improvements altering the channel of the river at this point, but took no precautions to protect this channel from future changes. The late floods cut an entirely new channel, however, destroying the approach, wrecking the bridge and leaving it stand useless over the abandoned channel. The loss is so great that the company now fears that it may have to abandon the Short Line, although this has not been definitely settled.

Tacoma (Wash.) Municipal Railway.—It is reported that the Tacoma Municipal Railway will be double-tracked from the east end of the viaduct to the Todd shipbuilding plant. Operation has been begun over the Taylor Way extension of the line from Eleventh Street on Taylor Way to Lincoln Avenue.

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—The property of the Lewisburg & Ronceverte Railway has been taken over by local interests, and it is stated the line will be extended into Lewisburg.

Shops and Buildings

Southern Pacific Company, Los Angeles, Cal.—Plans are being made by the Southern Pacific Company for the remodeling of its timber-preserving plant at West Oakland, Cal., at an estimated expenditure of \$350,000. The improvement includes the reconstruction of the track layout, the filling in of a portion of the bay to provide room for expansion and the installation of modern timber-treating equipment.

Georgia Railway & Power Company, Atlanta, Ga.—Work has been begun by the Georgia Railway & Power Company on the construction of a new passenger station at Camp Gordon.

Lake Shore Electric Railway, Cleveland, Ohio.—It is reported that the Lake Shore Electric Railway is considering the construction of a new interurban station at the present site on Erie Avenue, Lorain. Plans drawn up some time ago by the company call for a \$65,000 station.

Philadelphia, Pa.—Sealed proposals will be received by the Department of City Transit, William S. Twining, director, until 12 o'clock noon on Feb. 14 for the following work appurtenant to the Frankford Elevated Railway: Contract No. 541—Plumbing installations in station buildings at Torresdale Avenue and Tioga Street; Contract No. 542—Electric installations in station buildings at Torresdale Avenue and at Tioga Street. Copies of plans and specifications may be obtained upon deposit of \$10, to be refunded upon return of plans.

Wheeling (W. Va.) Traction Company.—The Bay Island carhouse of the Wheeling Traction Company, containing twenty-nine double-truck passenger cars and one work car, was destroyed by fire on Feb. 4. The company will replace the equipment at once.

Power Houses and Substations

Chicago, Milwaukee & St. Paul Railway, Chicago, Ill.—The substation of the Chicago, Milwaukee & St. Paul Railway at Cle Elum has been completed, and is ready for the machinery. The structure is 104 ft. x 75 ft., of concrete and brick. It will house two generator sets, two transformers and a complete set of switches to receive and distribute 100,000 kw.

Quincy (Ill.) Railway.—This company has installed a new 1000-hp. boiler in its power house.

Brooklyn (N. Y.) Rapid Transit Company.—The proposed addition to its generating station at Kent Avenue and Division Street, which the Brooklyn Rapid Transit Company proposes to erect, will be about 275 ft. x 303 ft., one and six stories high. The cost of the addition is estimated at \$500,000.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Snow and Ice Removal Equipment in Brisk Demand

Electric Roads Seemingly Slackers in Storm Preparedness—Scrapers, Cutters, Torches on Call

Surprising as it may seem, and accepting the word of several manufacturers and sales agents for the fact, the electric railways are as a rule poorly equipped to combat snow and sleet storms. Makers of this equipment add that orders for snowplows are usually placed in the spring or early summer, with deliveries in the late fall. Emergency calls are evidently not reckoned upon, for it is seldom that any snowplows are kept in stock. This winter, however, the demand was abnormal, and purchasing agents and traffic superintendents appeared to be dumfounded when, on inquiry, they found no plows were to be had until the regular selling season. This practice is ascribed to trade usage.

Other snow-fighting and ice-clearing equipment was on the market, however, and judging from reported sales a lively business was transacted. A company that specializes on good roads apparatus states it has had a very large demand for its snowplow attachment. In fact, this concern frankly says: "We stocked up with a very good supply of attachments. The demand, however, owing to heavy snowstorms that have prevailed in all sections of the country, has been abnormal. At the present time we are almost entirely out of stock. We are likely to do quite a lot of business within the next month or two."

Every appliance that would clear away snow and ice has sold this year more quickly than for many years. Scrapers and cutters were especially in demand. A horse-drawn machine, that removes snow as the wheeled and drag road scraper does in handling dirt, has been particularly efficacious on railways in city streets. The manufacturer said if conditions had been normal and he could have secured materials promptly, he would have sold several times as many machines as he was able to put out. "Unfortunately," he continued, "conditions this winter have operated to make it a difficult matter to do business. It has been hard to get materials, and the continual freight embargoes have made it almost impossible, in many cases, to deliver goods."

Yet another device, that is selling better than for many years, is a cutter of flanged teeth that can be attached to the under side of the snowplow beam. The attachment cuts down the devil-strip of ice between the tracks to a

point that will clear the motor boxes, and thus save energy and wear and tear on the boxes and cars. It is said to be used to a great extent on New England traction roads. It is designed for city street track work. There has been no advance in price since May last. Deliveries are shipped out of stock—made up in off season—and go via express, unless embargoes intervene.

THAWING OUTFIT SALES LARGE

Torches or thawing outfits have also been on brisk call. A company specializing on these goods states they are adapted for thawing out frogs, switches, derails, throw rods, air brakes and switch boxes, also melting ice from interlocking plants, pipe line and pipe carriers, brake beams and fenders. The last advance of 10 per cent in price was made on Dec. 1 last. Raw material is hard to obtain. Deliveries are fair—in two or three weeks by express now, when shipments are accepted. A longer time is required when special sizes are ordered, although five standard patterns are carried.

One maker of sleet cutters, of which mention was recently made in the *ELECTRIC RAILWAY JOURNAL*, observed that in his experience few electric roads take the obvious precaution of keeping a stock in their carhouses for immediate use when necessary. They take a chance. This condition or frame of mind is further illustrated in the case of one of the Eastern roads. When the late snow storms tied up its track the two snowplows of the company were too small—totally inadequate—to meet the emergency. Its cars could make no headway on the snow-filled roadbed and, in several instances, were stalled all night with belated passengers aboard. The Public Service Commission subsequently recommended the purchase of six efficient snowplows.

Car Wool Waste Higher

Supply and Delivery in Fair Condition—China Chief Source

Car wool waste, on certain grades, was advanced 1 to 2 cents a pound on Feb. 1. The supply is fairly good. With the close of the Russian and Mediterranean markets, the chief source of raw material, China is now the main reliance for the cheaper wools obtained from the fleece of its long hair goats. This description of waste is used for packing car journals, and it must therefore be superior in quality to cotton waste. The grade with a long staple is the best, and this is a by-product in the manufacture of the cheaper carpet wools and yarns. Deliveries are fair.

Devices for Averting Trouble with Frozen Air Brakes

Severe Cold Weather Has Increased Sales—More Widely Known and Used This Winter

Any device adapted to keeping equipment in operative condition at this time has seasonal interest. Manufacturers of an "air rectifier," which is a device for overcoming what is known in railway work as "frozen air" in air brake systems, report it as commanding uncommon sale during this unusually severe winter. Briefly, the device automatically supplies to the air-pipe system, when needed, the requisite amount of alcohol, or a similar non-freezing liquid, in the form of a vapor or spray. This lowers the freezing temperature of the fluids or vapors in the pipes and cylinders and keeps them from clogging.

This year the distributors of the device advise that recent orders have been received from the Omaha & Council Bluffs Street Railway; Gary & Interurban Railroad; Charles City Railway; Springfield (Mass.) Street Railway; Terre Haute, Indianapolis & Eastern Traction Company; East St. Louis & Suburban Railway; New York State Railways; Lincoln Traction Company; Mahoning & Shenango Railway & Light Company, and the Lackawanna & Wyoming Valley Railroad. The Philadelphia Rapid Transit Company is also reported as testing the system. Prices have not been increased recently and deliveries are subject to the embargoes in the Eastern territory.

The manufacturers of a widely-known air brake have an entirely different method of obviating frozen brakes, consisting of auxiliary pipes or air-storage tanks, with which electric surface cars are equipped. New as well as old rolling stock, on which air brakes are installed, may be so fitted up. This appliance has been in active demand throughout the winter and particularly now; and its use is increasing throughout New York State, Pennsylvania, New England, the Middle West and Northwest—wherever low or freezing temperatures are encountered. The coils, in connection with the cylinder or reservoir, keep the brakes in workable condition at all degrees of cold, as they are automatic in action. No change in prices has occurred, and deliveries are as dependable as freight congestions everywhere will permit, the very conditions that make for better business having greatly delayed delivery. However, this complaint is general

Car Equipment Material Moving Along Better Lines

Advance in Prices—Deliveries Blocked by Embargoes—Business Outlook Far from Pessimistic

Reports from many sources are more encouraging than for months before, and an observer finds it difficult to escape the conviction that business with manufacturers and distributors of railway material and accessories is improving. It is evident that traction companies have been reducing their buying disbursements to a minimum in order to make as favorable a financial statement as possible at the end of the year. A number of representative firms in the east state that January was better, from a selling point of view, than any month in the preceding half year. In car equipment and supplies buying is along more liberal lines, if such a term is permissible under existing conditions. Shipments in the Eastern territory are practically at a standstill on account of the embargoes from Pittsburgh to the seaboard. Deliveries are consequently problematical.

Transformers, converters, controllers and motors, with no change in price, are not deliverable under five months. Circuit breakers have been going up from time to time, the last advance being on Nov. 27. Some types have remained untouched, and no further increase in price is anticipated for the present at least. Sales are reported as heavy by a leading manufacturer, especially for large capacity breakers. Car hood breakers are selling fairly well, principally for replacements, maintenance and breakages. Deliveries are from three to four months slow, the embargoes being extremely bothersome along the Atlantic seaboard. Express shipments are from three to four times longer in reaching destination than normally!

A widely-known manufacturer of circuit breakers and other staples in electric railway accessories, while declaring the demand was strong, added the plant was so filled up with war material products of a special character that no orders for breakers were being accepted or even considered. Deliveries are behind six to eight months, and other railway appliances here on delivery fourteen months. The situation is deplorable in this respect, but it is beyond remedy just now.

CAR HEATERS HIGHER.

Recently a 10 per cent advance was put into effect on a certain make of car heaters, but heretofore the price in the experience of this firm, had not followed the upward revisions in the metal market. Deliveries by this concern are ordinarily from four to five weeks, either by freight or express. Shipments are suspended by the blanket embargo. In one instance this concern offered a large quantity of heaters to a railroad company for shipping eight times, to have it refused. Goods are ready to go out from the factory in a few days, but transportation facilities are lacking. A rush order for a Connecticut point was sent from New York by auto truck, the consignee paying all expenses. Suf-

ficient raw material is in stock, according to this producer, to take care of ordinary business; but if a large order came along it would be impossible to fill on guaranteed delivery. The cost of resistance wire is now said to be from 300 to 400 per cent higher than normally and difficult to obtain.

AIR-BRAKE DEMAND NORMAL.

Air-brake conditions are said to be almost normal so far as demand and supply figure. Several fairly large orders are being looked upon as certain to materialize in due course for replacements caused by the recent loss of rolling stock of several companies by fire and other accidents. The market in traction air brakes is active when the purchase of new cars is contemplated or decided upon, a situation the present time does not reflect. No price advances have been made since October last and none is anticipated. Standard brakes are promptly deliverable out of stock, providing shipping facilities are available. On special sizes deliveries are at the convenience, to a considerable extent, of the factory.

For gears and pinions a brisk demand is reported. Traction lines usually carry a pretty fair stock, but sales are steady. No change in quotations are furnished, the difficulty being in getting material. Labor is the most troublesome factor at present. Skilled workmen are scarce. Deliveries are behind from five to six months and even a year. Goods go out as soon as fabricated. There is no reserve stock to draw on. In this line buying has been improving, the last half of January having been much better than the first two weeks. The outlook is also promising, an opinion probably based on a few railways having been conceded a higher fare.

Street railway metallic filament lamps of 23, 36 and 56-watt sizes are in fair delivery. An increase of 10 per cent was made on Jan. 1, as previously announced in the *ELECTRIC RAILWAY JOURNAL*. The demand is normal and steady, with a slight increase at points reached by direct factory shipment. Manufacturers are just about meeting the demand, accepting the statement of a large producer, who also stated that there was, however, no accumulation of stock and no diminution in production. Breakages figure largely in replacement. The purloining of lamps by passengers is also claimed as a factor, but this is being overcome to a certain extent by using a locked socket.

Car seats, only ordered for new rolling stock now almost impossible to obtain excepting on long delivery, are therefore not active. A sharp demand for second-hand seats is noted and the market is about cleaned up. In a few weeks an advance on the entire line of new seatings will be made, to become effective immediately as announced.

Fare boxes of the improved types are

gradually being installed in the metropolitan territory. The demand is increasing and manufacturers are looking for their general adoption on the principal lines. Deliveries are prompt if transportation can be engaged. A carload came in from the West recently in ten days which is good time. Prices are unchanged.

Slack adjusters and lightning arresters are selling well. A recent order for more than 4000 adjusters was placed last week by the Philadelphia Rapid Transit Company. The government recently closed a contract for 6000 lightning arresters of a special type to be sent to France.

Ventilators, cord, curtains, shades, springs and general hardware, glass and similar accessories, indicate normal conditions, dependent largely on the new rolling stock situation. About two weeks ago car curtains here advanced 5 per cent. Car springs are in moderate sale, the difficulty is to obtain steel. Deliveries are reported as dependent on the elasticity of embargoes and the release of shipping facilities.

Iron and Steel Production Hard Hit

Transportation Tie Up Resulting from Weather Conditions Cuts Output Practically in Half

With prevailing conditions in labor and transportation, the iron and steel producers have been particularly hard hit during the last few weeks. Weather conditions and embargoes have limited transportation considerably and reports are more pessimistic than they have been. The heavy and frequent snow falls since the beginning of the year have practically demoralized traffic, and mills are finding it more difficult than ever to secure supplies. Large steel companies have closed up work and others have been running under reduced schedules, while authentic reports state that not more than half the blast furnaces in Pittsburgh are in operation. Some reports, however, place production of not more than 65 per cent.

It is, of course, quite evident that with the supply of iron and steel becoming lessened that the loss will fall almost entirely on the private consumer. In other words, those working on government orders will be made to feel this curtailment of production the least in all probability. The delay, therefore, in production and delivery of iron and steel products may not be expected to be lessened for some time.

Catalogs Wanted

W. R. Wood, acting assistant general superintendent of rolling stock and shops of the Rio de Janeiro Tramway, Light & Power Company, Rio de Janeiro, Brazil, desires to have manufacturers' publications, catalogs, descriptive matter, etc. Considerable new work is reported to be under way at Rio de Janeiro. Mr. Wood was formerly connected with the Third Avenue Railway, New York, N. Y.

Rolling Stock

Sheffield (Ala.) Company is reported as having ordered new cars to meet the increased demands for transportation of workmen to the government's great new nitrate plant at South Florence, Ala.

Dallas (Tex.) Consolidated Electric Street Railway has just received the twelve new passenger cars, constructed by the American Car Company, St. Louis, Mo. which was referred to in the ELECTRIC RAILWAY JOURNAL of Nov. 17, 1917.

Philadelphia (Pa.) Rapid Transit Company, within a couple of weeks, placed an order for 100 city passenger cars, similar to the ones now in service, with the J. G. Brill Company. This rolling stock purchase may eventually total 150, but not 200, as mentioned in last week's ELECTRIC RAILWAY JOURNAL. The Government, as surmised, initiated the order for the convenience of shipyards in the vicinity.

Wheeling (W. Va.) Traction Company had destroyed by fire, probably incendiary, on Feb. 4, its Bay Island operating carhouse and twenty-nine double-truck air-brake passenger cars, and one new work car, all 5-ft. 2½-in. gage. The company is now operating about 75 per cent of its service. The Jewett Car Company for some time has had fourteen double-truck cars under construction for the company and completion will be hastened. The Wheeling Company is looking for complete cars of the above gage for temporary use and will arrange equipment for permanent replacement speedily.

Trade Notes

China Products Company, Zanesville, Ohio, has acquired the manufacturing plant, merchandise, tools, fixtures and raw materials of the Virginian Potteries Company. The property was turned over on Jan. 30.

Crescent Electric Manufacturing Company, Pittsburgh, Pa., recently bought the entire stock of the Pittsburgh Armature Works.

Automatic Railway Company, New York, N. Y., has been chartered with a capital stock of \$14,500 by L. H. Washburn, C. K. Allen and J. S. Wooster, 115 Broadway, New York City.

China Products Company, Zanesville, Ohio, has purchased the Virginian Potteries Company, its plant, manufactured products, tools, fixtures and raw materials. Possession was delivered to the new owners Jan. 10.

E. S. Fassett, formerly general manager United Traction Company, Albany, N. Y., has been elected director and secretary of Goldschmidt & Forbes, Inc., New York, dealers in metals and metal products. He will still remain sales manager of the New York Switch & Crossing Company, with which he has been connected for the last five



E. S. FASSETT

years, but he will resign his connection with the Habirshaw Electric Cable Company, New York, with whose sales organization he has been identified for the last two or three years. Mr. Fassett was president of the New York Electric Railway Association in 1908-1909. He resigned from the United Traction Company of Albany in 1912.

Westinghouse Lamp Company, New York, N. Y., has removed its advertising department from 165 Broadway (City Investing Building) to the Park Row Building, 21 Park Row, opposite the General Post Office. It has taken a suite of offices on the sixteenth floor.

Wagner Electric Manufacturing Company, St. Louis, Mo., announces the opening of a service station at Seattle, Wash., to take care of this branch of its business in the State of Washington and the Northwest.

Arnold Company, constructing engineer, 105 South La Salle Street, Chicago, has discontinued its New York office at 111 Broadway.

John D. Stout has been appointed Chicago representative for the Terry Steam Turbine Company, Hartford, Conn. Mr. Stout was at one time assistant engineer of the Terry company and was recently transferred from the New York office, where he was assistant manager.

War Trade Board, Washington, D. C., has announced new regulations regarding exports. After Feb. 1 a new application form will be used in place of all forms hitherto in existence. It will be the only application form in use. Copies of the blanks, with information pertaining to their purpose and other directions pertinent thereto, may be had on application to the board.

New Advertising Literature

Pyroelectric Instrument Company, Trenton, N. J.: Has circular No. 9 descriptive of Northrup millivoltmeter.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Leaflet 3986, descriptive of underfeed stokers, has been issued by the company.

General Electric Company, Schenectady, N. Y.: Bulletin 46,013, descriptive of switchboard-type instrument transformers, is being distributed by the company.

Manistee (Mich.) Iron Works Company: Bulletin 52, descriptive of Rees roturbo patent rotary jet vacuum pumps for surface condensers, is being distributed by the Manistee company.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.: Vol. 1, No. 3, of "Railway Engineering Data." A reprint from the ELECTRIC RAILWAY JOURNAL on "Problems Confronting the Electric Railway Industry" is also being distributed.

RAILWAY MATERIALS

	Jan. 30	Feb. 6
Rubber-covered wire base, New York, cents per lb.		30-32
Wire, weatherproof (100 lb. lots), cents per lb.		
New York	29¼-34¼	28¼-34¼
Wire, weatherproof (100 lb. lots), cents per lb.		
Chicago	33¼-38 35	38.35
Rails, heavy, Bessemer, Pittsburgh, per ton	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.31	\$1.31
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.32	\$1.32
White lead (100 lb. kegs), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	50	49

*None offering.

NEW YORK METAL MARKET PRICES

	Jan. 30	Feb. 6
Copper, ingots, cents per lb.	23½	23½
Copper wire base, cents per lb.	27	27
Lead, cents per lb.	6.75	7.00
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7.92½	7.87½
Tin, Straits, cents per lb.	*85.00	*85.00
Aluminum, 98 to 99 per cent, cents per lb.	34-36	34-36

OLD METAL PRICES—NEW YORK

	Jan. 30	Feb. 6
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19½	19½
Red brass, cents per lb.	17½	17½
Yellow brass, cents per lb.	13½	13
Lead, heavy, cents per lb.	5½	5½
Zinc, cents per lb.	5½	5½
Steel car axles, Chicago, per net ton	\$43.42	\$42.42
Old carwheels, Chicago, per gross ton	\$35.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00



Peacock Type G— the Tom Thumb Brake for Tom Thumb Cars

What better example that little fellows can do things than the story of Tom Thumb, Esq., or of the modern one-man car?

Where bigger fellows fell down, these have come through with the goods in the form of frustrated villains and better revenues respectively.

Tom and the new One-Manners were built for efficiency; not just for size and weight.

The Peacock Type G is the Tom Thumb among brakes, weighing only 25 lb., but its combination of strength and brains makes it ideal for all the lighter forms of the One-Man car—

While the Peacock Staffless—which sets out only $3\frac{1}{4}$ in. in the vestibule—will handle One-Man cars of any weight.



The Eccentric
Drum

National Brake Co.
Buffalo, N. Y.

Bankers and Engineers

Electric Railway, Lighting and Power Company Bonds

ENTIRE ISSUES PURCHASED

THE NATIONAL CITY CO.

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Industrial Plants and Buildings, Steam Power Stations,
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Analytical Studies of financial and operating conditions,
appraisals and rate adjustments of electric railway and
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Electrical, Photometrical and
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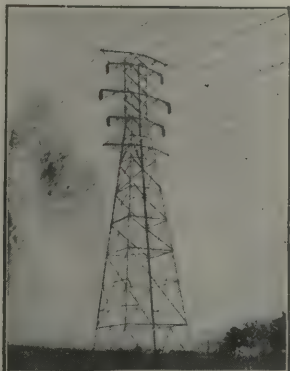
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ELECTRIC RAILWAYS

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HUDSON TERMINAL-30 CHURCH STREET, NEW YORK

Manufacturers of Steel Structures of all classes
particularly BRIDGES AND BUILDINGS



Transmission Tower, Pittsburgh, Pa.
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Baltimore, Md., Continental Trust Bldg.	Duluth, Minn., Wolvin Building
PITTSBURGH, PA., Frick Building	Minneapolis, Minn., 7th Ave & 2nd St. S. E.
Buffalo, N. Y., Marine National Bank	
Cincinnati, Ohio, Union Trust Building	
Atlanta, Ga., Candler Building	
Cleveland, Ohio, Guardian Building	
Detroit, Mich., Beecher Ave. & M. C. R. R.	
CHICAGO, ILL., 208 South La Salle St.	

Pacific Coast Representative:

U. S. Steel Products Co. Pacific Coast Dept.
SAN FRANCISCO, CAL., Rialto Building
Portland, Ore., Selling Building
Seattle, Wash., 4th Ave. So. Cor. Conn. St.

Export Representative:

United States Steel Products Co., 30 Church St., N. Y.

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Manufacturers of Aluminum, Ingot, Sheet,
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Chicago.....	1500 Westminster Building
Cleveland.....	950 Leader-News Building
Detroit.....	1512 Ford Building
Kansas City.....	308 R. A. Long Building
New York.....	120 Broadway
Philadelphia.....	1216-1218 Widener Building
Rochester.....	1112 Granite Building
San Francisco.....	731 Rialto Building
Washington.....	509 Metropolitan Bank Building

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LATIN AMERICA—Aluminum Co. of South America, Pittsburgh, Pa.
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Send inquiries regarding aluminum in any form to nearest Branch
Office, or to General Sales Office.

THE BEST PROOF

of the *NEED* for the Searchlight Section is the large number of requests constantly received by the publishers for information as to where second-hand machinery or certain services can be obtained.

The Searchlight Section

is now the market place where these wants can be made known and filled.

Get your Wants into the Searchlight

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

THE P. EDW. WISCH SERVICE

Suite 1710 DETECTIVES Suite 715
Park Row Bldg., New York Board of Trade Bldg., Boston



You Are Never in Doubt

when your road is protected by

Nachod Signals

No matter what your road conditions are, a Nachod will take care of them. There are 7 types of Nachods for all service, from high speed interurban to city travel.

Write for information.

Nachod Spells Safety.

NACHOD SIGNAL CO., Inc.
Louisville, Ky.

PACIFIC COAST REPRESENTATIVES

MOYLES & SMITH CO., Portland, Oregon, San Francisco, Cal.,
Los Angeles, Cal.

1134

A Tax on National Intelligence National Information National Progress National Unity — Why?

If there was ever a time when every possible aid to national unity of thought—national dissemination of information—national methods of doing business—should be fostered and helped, now is that time.

The most powerful instrument to this end is a *national press*.

Yet it is at this vital moment of crisis that Congress sees fit to pass a bill, the practical and definite effect of which is to stultify and cripple the service which national publications are capable of rendering and put a premium on the distribution of purely local publications.

A Barrier to National Exchange of Thought

Under the zone system the further a publication reaches the greater is the charge for its carriage and delivery.

A great newspaper of national influence and prestige, carrying to its readers news and information from all the world, such a paper as the *New York Times* or the *Chicago Tribune*, is forced to pay a tremendous carrying charge, while the purely local publication which from the very nature of its organization and facilities can render a local service only, is carried at a relatively low charge.

While, of course, not so serious in its immediate material effects, this Act of Congress is in principle the same as if a bill were enacted to cripple the great transcontinental railway lines and put a premium on the business of local lines tapping comparatively limited territory.

And its effects are serious enough, even under the best interpretation.

A National Press Unifies National Sentiment

No man of sense will for a moment question the fact that a national literature is a tremendous factor in the unifying of a nation.

Nor will any man who knows anything of the subject deny that the present conditions have led to a wide distribution of first-class, high-grade literature in the United States at a lower relative cost than is the case anywhere else in the world.

To this condition much has been contributed by the wise policy of our Government for generations in providing the means for the distribution of good literature at low cost.

The great national circulations which have been built up under these conditions have tremendously developed the

efficiency and art of advertising which is in itself an enormous economic factor in the life of the people and one which has had a remarkable effect on the progress of industrial and commercial development.

To cripple and impede this progress, as this present Act of Congress will certainly do, is to put a chain on the facility of exchange of thought, opinion and sentiment throughout the nation and will hinder the progress of business and production in every channel.

Publishers Do Not Protest Taxation of Profits

To tax publishers of national periodicals as a war measure even to the extent of taking their entire profits is a step against which no

protest will be heard. Publishers have invited exactly that action. But to tax to the point of extinction an institution which has so important a part in the social and commercial life of the nation as the national periodical literature of the country is a matter which may lead to the most serious consequences.

Technically, this tax as levied will fall upon national publishers, and it is defended on the basis of the utterly exploded theory that such publishers enjoy a "subsidy" under the present second-class rates—a subsidy which this tax will cancel.

As we have clearly shown in this series of advertisements, there is no subsidy to publishers in these rates—the benefit of these rates goes directly to the final consumer—and this proposed tax will fall definitely upon the final consumer. It is a tax upon periodical publication service and it must fall finally upon the user of that service.

A Valuable Business Service Hampered

Its effect is not merely to decrease the use of good literature nationally distributed, but is also to hamper and limit that peculiarly valuable form of

service delivered through such media as agricultural papers, technical journals, business papers, trade papers, and similar kinds of periodicals which are of supremely practical business value to the farmer, the business man, the scientist and the professional man.

This bill is dangerous, hurtful, unnecessary. It should be repealed.

Will you write your Congressman and Senator urging them to repeal it for the good of the country?

McGraw-Hill Co., Inc., New York

Publishers of

{ Power Coal Age
Electrical World
American Machinist

The Contractor
Electrical Merchandising
Engineering News-Record

Electric Railway Journal
Engineering and Mining Journal
Metallurgical and Chemical Engineering

A NEW
Western Electric
DAVIS
FLOOD
LAMP



This new 500 watt unit is designed for "close up" or "short throw" work where wide diffusion is an essential. For long range lighting, the 1000 watt unit is most effective.

The maximum spread of the direct beam of the 500 watt unit is practically 40 degrees—in the indirect beam this is greater.

The unit is made of steel—bullet shaped—finished in rust-proof dark gray—absolutely water proof—easy to carry—easy to operate—easy to install.

For emergency lighting, the portable type is recommended—for permanent installation, the bracket type.

Write for price and further details.

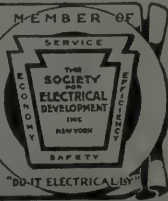
FOR
PROTECTION



Western Electric Company
INCORPORATED

New York	Atlanta	Chicago	St. Louis	San Francisco
Boston	Savannah	Cleveland	Cincinnati	Oakland
Newark	Birmingham	Indianapolis	Kansas City	Los Angeles
Elizabet	New Orleans	Detroit	Enid	Seattle
New Haven	Chattanooga	Milwaukee	Oklahoma City	Portland
Philadelphia	Baltimore	Minneapolis	Dallas	Salt Lake City
Pittsburgh	Richmond	St. Paul	Houston	Denver

EQUIPMENT FOR EVERY ELECTRICAL NEED



FOR
PRODUCTION



Just a Part of the Columbia Equipment for Turning out Bearings



You will understand the perfection of Columbia-made products when we tell you that we have several hundred machine tools alone.

Practically each tool, be it drill, shaper, borer, grinder, planer or lathe,

is handled by the same man day in, day out.

Such specification inevitably results in turning out the best possible work.

That's only one of many reasons for using Columbia-made products.

TOOLS

Armature and Axle Straighteners
Armature shaft straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car hoists
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and Axle Bearings
Armature and field coils
Bearings (Axle and Armature)
Brush-holders and brush-holder springs
Brake door and other handles
Brake forgings, riggings, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail shoe beams and accessories
Trolley poles (steel) and wheels



Columbia Machine Works & Malleable Iron Co.
Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.

Holden & White, Inc., Chicago

F. F. Bodler, San Francisco

Railway & Power Engineering Corp., Ltd., Toronto, Canada





Collier Service *Secures Patrons for Car Advertising*

If you read car advertisements—and who doesn't?—you must have noticed the number of representative national advertisers.

The purchasers of this advertising service did not beg for admission to the street car racks. They had to be *shown* that street car advertising is profitable.

They were not interested in the car card space alone—they were interested in the message Collier Service could put there.

A visit to the art department of Collier Service just to watch an artist produce an effective card is an eye-opener showing how this organization makes car card advertising an asset for its customers, and therefore an assured income to the Railway Company.

Barron G. Collier
INCORPORATED

Candler Building

220 West 42nd Street, New York City

To Owners Of Industrial Plants

Every steam plant consuming five (5) tons of coal per day should employ some adequate method of checking its boiler and furnace efficiency.

The price of ignorance is waste. These must be replaced by *Knowledge and Efficiency*.

There are, broadly speaking, two methods for checking boiler room efficiency.

**1—Daily accurate measurements of coal
and feed water.**

2—Systematic flue gas analysis.

Both methods should be employed in a plant of large size.

You are requested to place your boiler plant under as careful a system of Accounting and Supervision as any production department of your business.

Nothing will more effectively assist your firemen in getting high results from the coal than to provide means for determining what results he is getting.

Call in a competent fuel engineer, if necessary, in order to advise and instruct you in the installation and efficient use of a suitable system for your plant.

UNITED STATES FUEL ADMINISTRATION



Your Own Electric Railway Journal

THESE are the advantages of being a personal subscriber for the Journal: You receive your own copy of the paper each week. You have it to read when you want it and as long as you want it. You can keep your own file of the paper for reference.

For less than 6 cents a week you can be a personal subscriber—you can get all the news of the field while it is still fresh and valuable—you can have a constantly growing library of your own on all branches of electric railroading.

You will never miss the subscription price, but you will miss a lot of things if you do not get the Journal.

COUPON

Name

Position and Company.....

Address

Electric Railway Journal, 10th Ave. at 36th. St., New York

Zone Your Fares

If you cannot obtain an increase in your flat rate of fares, perhaps you can obtain acceptance of the zone system.

How this system can help you, what its advantages are, how to determine proper zones, how to collect fares at zone terminations, how to introduce the zone system, how it works in Milwaukee—

These points and many more concerning street railway costs and returns are covered in

Street Railway Fares

by

Dugald C. Jackson
and David J. McGrath

169 pages, 6 x 9, fully illustrated, price \$2.50
(English price 10/6) net, postpaid

This book contains the findings of the recent investigation of the 5c fare carried out under the auspices of the Massachusetts Institute of Technology.

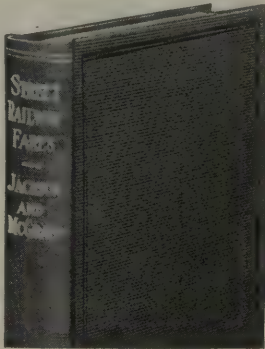
The data of street railway traffic and fares have been broadly investigated. The factors of street railway traffic which influence the cost of carriage and how these factors affect the practicability of making long hauls for 5c in ordinary service, are given in full.

This report is fully illustrated with tables and charts which clearly show the limitations and possibilities existing in the field of electric street railway transportation at the present time.

This is an authoritative discussion of present problems. It should be in the hands of every electric railway executive.

Send no money—
just the coupon

Let us send you a copy of the book for ten days' free examination. This will not place you under any obligation, and it will give you an opportunity to see whether or not the book can be of value to you. Simply fill in and mail the coupon.



FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc.,
239 West 39th St., New York, N. Y.

You may send me on 10 days' approval:

Jackson and McGrath—Street Railway Fares—\$2.50
net, postpaid.

I agree to pay for the book or return it postpaid within 10 days of receipt.

...I am a regular subscriber to the Electric Railway Journal.

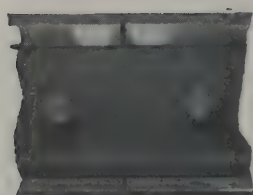
...I am a member of A. I. E. E. or A. E. R. A.

(Signed)

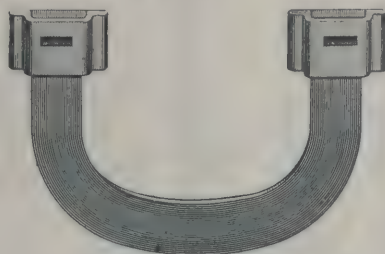
(Address)

Reference(E. 2-9-18)

(Not required of subscribers to the Electric Railway Journal or members of A. I. E. E. or A. E. R. A. Books sent on approval to retail customers in U. S. and Canada only.)



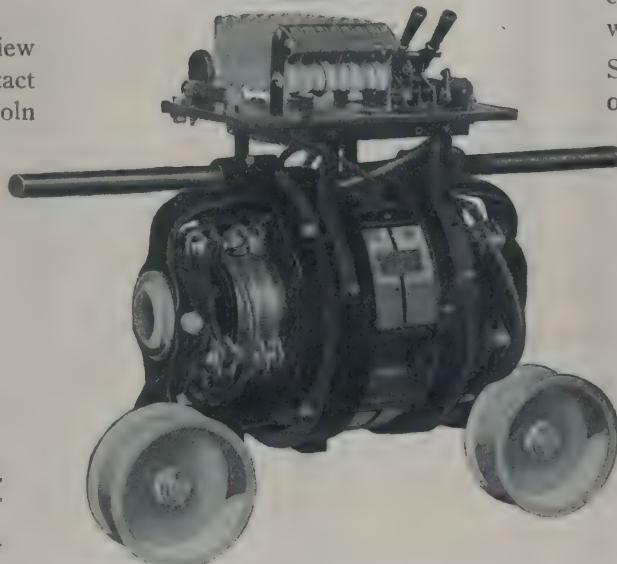
← The LINCOLN Bond →



The welded portion of the Lincoln Bond has an area six times as great as the bond.

The two white spots in the view above show the large contact area. To the right, a Lincoln Bond is shown in place.

The welder itself is so light that two men can lift it off and on the tracks with ease.



VIEW OF BONDING MACHINE FOR BONDING ONLY

By equipping it with a stabilizer, the Lincoln Bonding Machine can be used for shop welding as well as track work.

Some roads have saved the price of their Lincolns in shop repair work the first month.

Why don't you get a Lincoln, and let it do all your welding jobs?

Ask us for some proofs of our claims.

THE LINCOLN

636 Huron Rd.,

Lewis Roth Co., 1012 Liberty Bldg.,
Philadelphia, Pa.; 519 W. 38th St.,
New York, N. Y.

Charles N. Wood Co., 14 Federal Street,
Boston, Mass.

W. H. Elliott, Chattanooga, Tenn.

BONDING CO.

Cleveland, Ohio

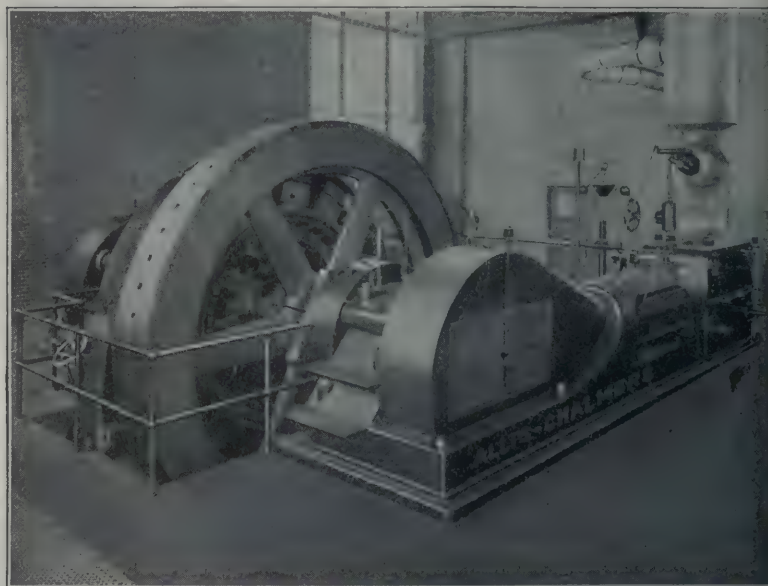
Holden & White, Inc., Fisher Bldg.,
Chicago, Ill.

W. C. Burdick, First National Bank
Bldg., Milwaukee, Wis.

The Electrical Engineering & Mfg. Co.,
1st Nat. Bank Bldg., Pittsburgh, Pa.

**WE HAVE BUILT
6,000,000 HORSE POWER
STEAM ENGINES
GAS ENGINES
OIL ENGINES**

We also build
Steam Turbine
Condensers
Generators
Motors, Etc.



Cross-Compound Direct-Connected Corliss Engine Unit.

Our 40 years' experience is at your service

ALLIS-CHALMERS MANUFACTURING CO.

MILWAUKEE, WIS., U. S. A.

ECONOMY IN REPLACEMENTS

IT'S THE CONSTANT "LITTLE REPAIRS" THAT BUILD UP BIG MAINTENANCE COSTS

If you will check up on the cost of the work that is being done along your line—not the big replacement and new construction work—but just the little jobs replacing a few rotted crossarms or a few decayed ties, or a bit of fencing, you will probably be surprised to find how much these items total in the course of a year.

Of course you are never going to get away from *all* of this sort of expense, but you can eliminate a surprisingly heavy proportion of it by using

CYPRESS

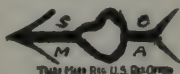
"THE WOOD ETERNAL"

not only on new construction, but on all replacement work.

ALL-HEART CYPRESS comes the nearest to being "decay proof" of any lumber suitable for railway use.

Several of the largest railway companies in the country have found the use of Cypress a paying investment.

THEY'VE LEARNED TO INSIST ON SEEING THIS MARK ON EVERY BOARD AND ON EVERY BUNDLE.



The data that substantiates this fact will be promptly furnished, if you ask for it.

SOUTHERN CYPRESS MFRS' ASS'N

1265 Hibernia Bank Building, New Orleans, La., or
1265 Heard National Bank Building, Jacksonville, Fla.



Why —

tear up tracks

when rails can be ground rapidly and accurately by untrained, ordinary workmen, to a degree of smoothness which is equal to that of newly laid track.

RECIPROCATING TRACK GRINDER

—does just that thing! Grinds uneven rails as smooth as newly laid ones. No crossovers are required, because the machine is easily moved off the track to permit the passing of a car. The Reciprocating Track Grinder is easily adjustable to gauge.

Write for Particulars.

RAILWAY TRACK-WORK COMPANY

30th & Walnut Streets
PHILADELPHIA, U. S. A.

Agents

Holden & White, Inc., 343 S. Dearborn St., Chicago
Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



STANDARD STEEL WORKS CO.

Morris Building, Philadelphia

New York
Chicago
St. Louis
Pittsburgh
San Francisco
Richmond

Portland
Havana, Cuba
London, Eng.
Melbourne, Aust.
Monterey, Mex.
Mexico City.



"Van Dorn"

Reliability is the primary essential of street railway gearing, and as this implies durability also and consequently involves economy the best gearing obtainable is none too good.

That's why "VAN DORN" gearing is the choice of so many important street railway companies.

We want to figure on your requirements if you want this kind of gearing.

Write Dept. E. R. J.

**The
Van Dorn & Dutton
Company**
(Gear Specialists)
Cleveland, Ohio

SALES OFFICES:
Atlanta, Boston, Chicago, Denver,
Kansas City, Milwaukee, New York
St. Louis, San Francisco, Toronto.



FREE

—a handbook on economical connections—and a sample Frankel Solderless Connector.



Factory:
177-179 Hudson St.,
New York
Sales Rooms:
1140-1146 Broadway

The man on your road responsible for economical and proper electrical connections will appreciate the story that this book and sample connector will tell.

Both represent new ideas—both point the way to better splices.

You incur no obligation in writing for them. Do it now.

STEEL POLES For Every Pole Purpose



Bates Steel Poles Ornamenting the Approach to the New Wisconsin State Capitol Building, Madison, Wis.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.
We have constantly on hand about two thousand tons of steel and can make immediate shipments.
A full line of convenient malleable fittings.

Our steel pole TREATISE tells a big story. Ask for it.

BATES EXPANDED STEEL TRUSS CO.

208 South La Salle St., Chicago, Ill., U. S. A.

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.

Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates

Turnouts and Cross Connections

Kerwin Portable Crossovers

Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

AWARDED



American Rail Bonds

Crown
United States
Twin Terminal
Soldered

American Steel & Wire Company

Chicago New York Cleveland Pittsburgh Worcester Denver

Export Representative: U. S. Steel Products Co., New York

Pacific Coast Representative: U. S. Steel Products Co.

San Francisco Los Angeles Portland Seattle

HIGHEST QUALITY

TRACK SPECIAL WORK



WE MAKE THIS GRADE ONLY

CLEVELAND FROG & CROSSING CO.
CLEVELAND OHIO

SPECIAL TRACK WORK

SWITCHES, FROGS AND CROSSINGS.
ANTI-KICKING BIG HEEL
SWITCHES.



TRACK WORK
OF EVERY DESCRIPTION.
HARD CENTER CONSTRUCTION.
Balkwill Articulated Cast Manganese Crossings

New York Switch & Crossing Co.
Hoboken, N. J.

THE LINDSLEY BROTHERS CO.

Western "Good Poles Quick" Northern

Quick Shipments
from our
Minneapolis Yard

Rooms 832-834, 72 West Adams St., Chicago, Ill.
Spokane - St. Louis

Butt Treating
Open Tank and
"Hot and Cold" Processes

FEDERAL SIGNAL CO.

ALBANY, N. Y.

CONSULT OUR ENGINEERS ON YOUR
SIGNAL REQUIREMENTS

52 Vanderbilt Avenue, New York Monadnock Block, Chicago
118-130 New Montgomery St., San Francisco, Cal.

"NATIONAL" Tubular Steel Poles
for Telegraph, Telephone
Electric Light and Electric
Railway Construction.
Write for literature.

National Tube Co. PITTSBURGH, PA.

The Trenton

Three Section Tower Outfits to fit any make of chassis.
Write for literature and prices.

J. R. McCARDELL & CO., Trenton, N. J.

POLES WESTERN CEDAR PILING

We brag about the SERVICE we give

B. J. CARNEY & CO.

E. B. BRANDE, Manager M. P. FLANNERY, Manager
819 Broad Street Grinnell, Ia. Spokane, Wash.
WM. MULLER & CO., 1729 McCormick Bldg., Chicago.
Commit us to memory.

Wire Rope
and Wire
Insulated
WIRES and
CABLES



JOHN A. ROEBLING'S SONS COMPANY, Trenton, N. J.

Aristos "COPPERWELD"—Copper Clad Steel Wire—

Beats Solid Copper 40 Ways

Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs Less to Maintain

GET DATA

Made from the product of Copper Clad Steel Co. of Pittsburgh, Pa.
General Sales Office PAGE STEEL & WIRE Western Sales Office
Page Steel & Wire Co. COMPANY Steel Sales Corporation
30 Church St., New York Monessen, Pa. Chicago, Ill.

Chapman

Automatic Signals

Charles N. Wood Co., Boston



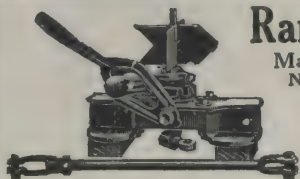
Transmission Line and Special Crossing
Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG.

ARCHBOLD-BRADY CO.

Engineers & Contractors

SYRACUSE, N. Y.



Ramapo Iron Works

Main Office, Hillburn, N. Y.
New York Office: 30 Church St.

Automatic Switch Stands,
T-Rail Special Work,
Manganese Construction,
Crossings, Switches, Etc.

EUREKA PRODUCTS

Commutators, Trolley Wheels, Sleet Trolley Wheels,
Trolley Ears, Line Material, Controller Fingers, Brush
Holders, etc

We make quality goods.

THE EUREKA COMPANY, North East, Pa.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Poles, Harps and Wheels,
Bronze and Malleable Iron Frogs, Crossings, Section Insulators,
Section Switches.



Albert & J. M. Anderson Mfg. Co.

289-93 A Street, Boston, Mass.

Established 1877.

Branches—New York, 135 B'way, Phila-
delphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, 48 Milton Street.



"WHALEBONE"

Fibre Track Insulation

DIAMOND STATE FIBRE CO.

Elsmere, Del.

Bridgeport, Penna.

Chicago, Ill.

Kilby Frog & Switch Co.

BIRMINGHAM, ALA.

Tongue Switches, Mates, Frogs, Curves and
Special Work of all kinds for Street Railways

TOOLS

for all classes of electrical construction and repair
work. Write for catalog.

Mathias Klein & Sons Canal Station Chicago
25

Send for Our New Booklet on the Subject of Water as Used for Steam Making

The subject is one that cannot be dealt with adequately in the limited space of an advertisement.

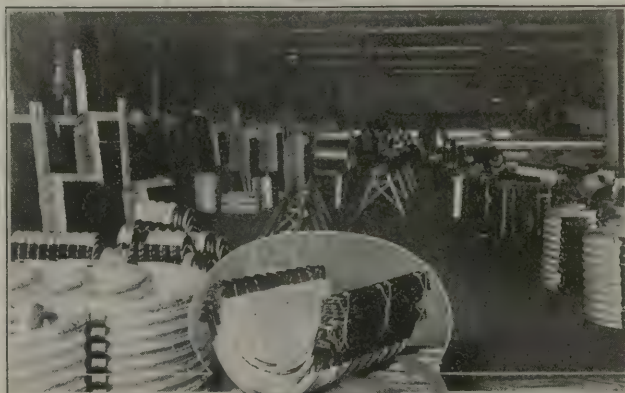
This booklet explains the causes of Corrosion, Incrustation, Foaming and other troubles, and offers a scientific solution of these difficulties. We believe it will make you realize more fully than you do already, how destructive of boilers and boiler efficiency untreated feed waters may be.

We believe a study of the booklet will also convince you that we are capable of dealing with the proposition in the most effective manner, and we hope that you will fill out the card at the back of the booklet and send to us with a gallon sample of your boiler feed supply for our analysis and proposition.

Let us have your address and the booklet will be forwarded at once.

Dearborn Chemical Company

General Offices, 332 South Michigan Ave., Chicago
Laboratory & Factory, 1029-1037 West 35th St., Chicago



This Nested Culvert

in use is 24 feet long and 18 inches in diameter.
Nested for shipment, it measures 2 x 2 2/3 feet x 16 inches.
Five thousand feet of this culvert may be easily loaded into one box car. Five thousand feet of ordinary full circle culvert would require four gondolas.

This shipping economy is possible only with

**"ACME" (NESTABLE)
CORRUGATED CULVERTS**

One man can unload, handle and install all the usual sizes of "ACME" (Nestable) Culvert.

We'll supply the culverts Set-up if desired.

Write for quotations and our Catalog G-3.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

A corner of the room where Acme (Nestable) Culverts are assembled.

The Babcock & Wilcox Company

85 Liberty Street, New York

WATER TUBE STEAM BOILERS

Steam Superheaters

Mechanical Stokers

Works: BARBERTON, OHIO—BAYONNE, N. J.

BRANCH OFFICES:

ATLANTA, Candler Building.
BOSTON, 35 Federal St.
CHICAGO, Marquette Building.
CINCINNATI, Traction Building.
CLEVELAND, New England Building.
DENVER, 435 Seventeenth St.

HAVANA, CUBA, Salle de Aguilar 104.
HOUSTON, TEX., Southern Pacific Bldg.
LOS ANGELES, I. N. Van Nuys Bldg.
NEW ORLEANS, 533 Baronne St.
PHILADELPHIA, North American Building.
PITTSBURGH, Farmers' Deposit Bank Bldg.

SALT LAKE CITY, 705-6 Kearns Bldg.
SAN FRANCISCO, Sheldon Bldg.
SAN JUAN, Porto Rico, Royal Bank Bldg.
SEATTLE, Mutual Life Building.
TUCSON, ARIZONA, Santa Rita Hotel Bldg.

FOSTER SUPERHEATERS

Greatly Increase
Efficiency and Power of
Steam Turbines.
POWER SPECIALTY CO.
Trinity Building, 111 Broadway
NEW YORK

WATER

**SOFTENING
OR
FILTRATION**

FOR BOILER FEED AND ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO.

PITTSBURGH, PA.

DIXON'S Graphite Brushes

are of uniform texture, free from abrasives and cannot possibly cut a commutator.

Booklet 108-M will interest you.

Made in JERSEY CITY, N. J., by the



JOSEPH DIXON CRUCIBLE COMPANY

Established 1827



The Automatic Reclosing Circuit Breaker



Type AA

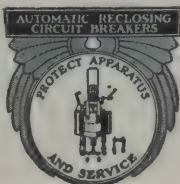
Write for Bulletins

The Automatic Reclosing Circuit Breaker Co.
Columbus, Ohio

The exacting requirements of public service demand that service interruptors shall be minimized in extent and duration as much as can be. The **AUTOMATIC RE-CLOSING CIRCUIT BREAKER**

Localizes D. C. Trouble and Restores Service —Automatically

—the instant the line is again O. K. The protection afforded by **AUTOMATIC RE-CLOSING CIRCUIT BREAKERS** is complete protection.



Repair Shop Machinery and Cranes

Built by

NILES-BEMENT-POND CO.

111 Broadway, New York

Boston Philadelphia Pittsburgh Chicago
St. Louis Birmingham, Ala. London

You are a faithful subscriber and reader of the Electric Railway Journal. You know how useful it is to you. Why not give us the names of those of your electric railway friends who would also benefit by being subscribers to the Electric Railway Journal? We will be glad to send specimen copies to any names and addresses that you mention.

ELECTRIC RAILWAY JOURNAL



"Everything in Insulation"

Mica
Vulcanized Fibre
Varnished Cloth
Insulating Tapes
Waxes
Asphalts
Compounds
Insulating Varnish

The above are only a few of our products. Write us for anything in this line you may require.

MITCHELL-RAND MFG CO.
103 John St., New York City

SHERWIN-WILLIAMS

AJAX

Insulating Varnishes Black Air Drying

A jet black, glossy and moisture-proof varnish, possessing the maximum amount of elasticity possible in a material of this character and air-drying in one-half hour. Used for dipping new armature and field coils and for repair work requiring a varnish which will air-dry quickly.

Black Elastic Baking

Particularly suitable for insulating high voltage generator windings, oil-cooled transformer coils and street railway motor armature and field coils, which are subjected to continued vibrations and varying loads. Bakes in eight hours at 200 degrees Fahrenheit. Is exceedingly elastic, absolutely impervious to oil and water and excellent in resistance to high temperature.



THE SHERWIN-WILLIAMS Co.

Paint and Varnish Makers

601 Canal Road, Cleveland, O.



We specialize in the manufacture of

High Grade Motor and Generator Brushes
For Railway Equipment

and for all other types of electrical machinery and are in position to make prompt deliveries.

THE UNITED STATES GRAPHITE COMPANY
SAGINAW, MICH.

BRANCH OFFICES:

Philadelphia New York Pittsburgh Atlanta Chicago St. Louis
Denver San Francisco



232

CONSERVES energy and triples the steaming capacity of your boilers. Write for Catalog "C."

MURPHY IRON WORKS
Detroit, Mich. U.S.A.

The MODERN WAY of handling ASHES is by the



GECO
STEAM JET CONVEYOR

GREEN ENGINEERING CO.
East Chicago, Indiana

Bulletin No. 1 Green Chain Grate Stokers.
Bulletin No. 2 Geco Steam Jet Ash Conveyors.

Hale and Kilburn

No. 108, Concave Seat
For One-Man and Other Cars

Only four parts—Steel Aisle End Support, Steel Wall End Support, hardwood-framed Rattan Cushion and Rattan Back. Note new yokeless pedestal and concave cushion



This No. 108 seat is only ONE-HALF THE WEIGHT OF SEATS WITH IRON CASTINGS.



Hale and Kilburn Co.

Philadelphia New York Chicago
Washington Atlanta San Francisco Detroit

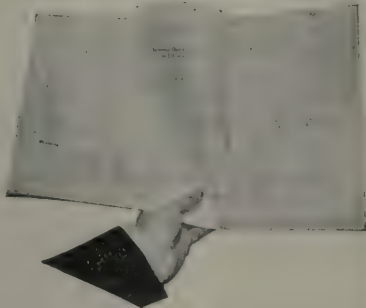
International Specialties Cover the Entire Range of Fare Collection

Money-counting fare boxes; Coin and metal ticket-counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven coin and transfer registers; Motor-driven registers for station, ferry, park and terminal use; Metal and paper registers with single hopper; Round and square registers; Transfer printers; Heeren Enamelled Badges; Punches and Bell Cord.

The International Register Company
15 South Throop Street, Chicago

Have You Read This?

It sets forth the fundamentals of energy saving through metering the energy used. A valuable treatise mailed on request.



ECONOMY ELECTRIC DEVICES CO.
EXCLUSIVE SALES AGENT
Sangamo Economy Railway Meter
50 OLD COLONY BLDG. CHICAGO

Full power with High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

The Buckeye
Jack Mfg. Co.
Alliance, Ohio



FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

INSULATING TAPE of Quality



STANDARD
Woven Fabric Co.
Walpole, Mass.

The Big Three
D & W Fuses, Deltabeston Wire
D & W Oil Fuse Cutouts
D & W Fuse Co., Providence, R. I.

JACKS

Barrett Track and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

Trolley Wheels



**Order
to-day**



NUTTALL Trolley Wheels are made of new phosphor bronze —no scrap used. Their design combines the maximum of material for the longest life without enough weight to cause sluggish trolley action and of sufficient hardness to stand long wear without injury to the wire. Because of the design of the groove, ruts will not be worn in it nor will it bind the wire.

For ordinary applications, wheels are equipped with graphite bushings, but in high-speed wheels these are supplemented by oil chambers cored in the hub.

NUTTALL
PITTSBURGH

WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.

VENTILATORS Also Ventilate in Stormy Weather.

THERMOSTATS Save Current.

ORIGINATED the use of **NON-CORROSIVE Wire** for Electric Car Heaters.

ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York



You will buy

**CLEVELAND
Fare Boxes**

Eventually—

Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO

Holden & White Inc.

Electric Railway Sales Distributors for:

Wasson Air-Retrieving Trolley Bases. (U. S.)
Garland Ventilators. Miller Trolley Shoe.
Perry-Hartman Center Plates and Side Bearings.

Watson Car Lighting Regulator.
Anderson Brake Slack Adjusters.
Reliance Air Sanders. Air Rectifier.

Chicago District Representatives for:

Drew Line Material.
Columbia Car & Shop Equipment.
Reciprocating Track Grinder.
Lincoln Rail Bonding and Bonds.

1508 Fisher Building

CHICAGO

HEATING AND VENTILATING YOUR CARS is the problem to-day. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY

1759 Mt. Elliott Ave., Detroit, Mich.

The Best Shade Rollers for Cars

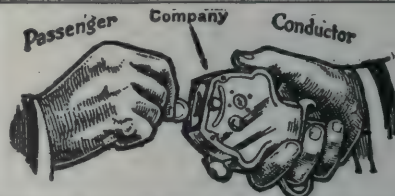
SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature

Stewart Hartshorn

Consolidated High Grade Products

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO. Albany New York



**Direct
Automatic
Registration
By the
Passenger**

**Rooke Automatic
Register Co.**
Providence, R. I.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company

Carlisle, Pa.

Bonham Traffic Recorders

Show origin and destination of every fare collected as well as other valuable traffic data.

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The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

The Standard for Speed, Accuracy, Durability B-V Visible Punch



BONNEY-VEHSLAGE TOOL COMPANY
61 New Jersey R.R. Ave.,
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UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company
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“Boyerized” Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
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Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

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Snow Scrapers for All Types of Cars That Make Good Absolutely

Prompt Delivery

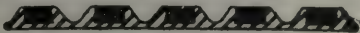
ROOT SPRING SCRAPER CO., Kalamazoo, Mich.

The “Hycap=Exide” Battery

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STORAGE BATTERY STREET CARS

THE ELECTRIC STORAGE BATTERY CO
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MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARHOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.
STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading railways. For details address
AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass.
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It’s Safe if You Used a ROLLER LOCK NUT



It’s the only self-tightening nut on the market. Use it as often as you like, but be sure you always use a *Roller Lock Nut*.

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are made for every condition and requirement. M. C. B. Pin and Link, Car and Air, in all sizes and types.

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“Trade Mark Reg. U. S. Pat. Off.”
Samson Spot Waterproofed Trolley Cord
Made of fine cotton yarn braided hard and smooth. Inspected and guaranteed free from flaws. Proved to be the most durable and economical. Samples and information gladly sent.
1 **SAMSON CORDAGE WORKS, BOSTON, MASS.**

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The Consolidated Car Fender Co., Providence, R. I.
Manufacturers of The Providence Fender and H-B Life Guard
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BEACH OIL ELECTRIC CAR

A self-propelled car of the latest type, embodying new and practical features.

Our engineers can help you turn branch line losses into profits.

ELECTRIC CAR & LOCOMOTIVE CORPORATION
Ralph H. Beach, Pres.
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You get more than simply BRAKE SHOES when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

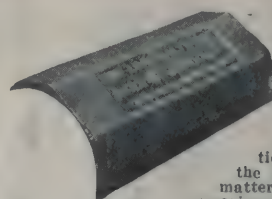
All of which means increased efficiency and decreased cost of Brake Maintenance.

American Brake Shoe & Foundry Co.

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Universally Serviceable

Ajax Car Brasses possess exceptional toughness and sufficient plasticity to conform to irregularities in the journal and the intrusion of foreign matter. They are slow-heating, and non-wearing on the journal. They are used on some of the largest trunk lines of the country and on many smaller systems—both standard and narrow gauge—on logging cars, mine cars, contractor's cars, etc. They give maximum service wherever used, with the least worry and lowest cost of upkeep. Catalog "Ajax Bearings, Castings and Babbitt Metal for Railway Equipment" gives all particulars. Copy on request.

THE AJAX METAL COMPANY

Main Office and Works
Philadelphia, Pa.

Established 1880
Offices in Principal Cities

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Steel for Service

For several years the Carnegie Steel Company has manufactured rolled steel gear blanks. It has given to their manufacture that technical skill and intelligence that characterize all of its products. Gears machined from

Carnegie Rolled Steel Gear Blanks

have distinctive merits. They may be heat treated to produce the very highest operating efficiency.

Gear blanks are made in many sizes, as illustrated in pamphlet on "Gear Blanks and Miscellaneous Circular Sections."

Carnegie Steel Company

General Offices—Pittsburgh, Pa.

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AMERICAN CARBON AND GRAPHITE MOTOR AND GENERATOR BRUSHES are made in all sizes and shapes, with or without pig-tails, and in grades suitable for all classes of Motor and Generator service.

AMERICAN CARBON & BATTERY WORKS ST. LOUIS, ILL.
OF NATIONAL CARBON CO., INC.

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RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS for Monitor and Arch Roof Cars, and all classes of buildings; also ELECTRIC THERMOMETER CONTROL of Car Temperatures.

141-151 WEST 22D ST. Write for Catalogue 1328 BROADWAY
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S-W Shim Slack Adjusters Save Brakeshoes and Labor

SMITH-WARD BRAKE COMPANY, Inc.

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HORNE RAILWAY DEVICES

Horne Double Acting Brakes

Giant Geared Brakes

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Lord Screenless Air Cleaners for Compressors

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SEARCHLIGHT SECTION



SIX CAR BODIES WITH NEW BRILL 27 G TRUCKS.

SIX CAR BODIES WITH USED MAXIMUM TRACTION TRUCKS.

Can furnish above with used West. 49 motors & specified wheels, Brill trucks.

One motor equipped closed double truck 10 window car, 2-GE 1200 motors.

Four open cars, single truck (2) GE 800 motors and (2) K2 controllers.

Twelve (12) bench open summer car bodies only.

Five single 4-wheel McGuire trucks, with 2-GE 52 motors only.

Immediate delivery our shops.

Also 2 miles selected 60-lb. steel Rails and Bars

ST. LOUIS RAIL & EQUIPMENT CO.

1208 Third Nat'l Bank Bldg.
ST. LOUIS, MO.

We can help YOU, too

SUPERVISOR—ways and structures. High-speed interurban electric, 200 miles of track, a small portion in city streets. Many heavy bridge structures. Location New York State. Advise age, experience, married, training, when available and salary expected. Box 1420, Elec. Ry. Journal.

I wish to congratulate you on the results obtained.

Within two days after first insertion, replies were received and I have to date a total of twenty very desirable applicants.

H. J. CLARK,
Chief Engineer.

Above ad cost only \$2.05 an insertion and was published but three times. This is only one example among many of the pulling power of the JOURNAL'S Searchlight Section.

WANTED

Six 4-motor equipments of either G.E. or W.H. Interpole type, 75 H.P. each.

Also

Two 4-motor equipments of either G.E. or W.H., from 125 to 150 H.P. each D.C. 500-600 volt operation.

THE C. E. A. CARR COMPANY

56 Imperial Bank Bldg.
Yonge and Queen Sts.
TORONTO, CANADA

SEARCHLIGHT SECTION

POSITIONS WANTED

AUDITOR, employed by small traction company, solicits change; 16 years' experience; age 39; married; references. PW-20, Electric Railway Journal, Cleveland.

MANAGER or general superintendent. Position as manager or general superintendent of city or interurban electric railway. Twelve years' executive and operating experience in all departments. Full particulars upon request. PW-15, Elec. Ry. Journal, Chicago.

SUPERINTENDENT or assistant superintendent of transportation, 40 years of age; expert on schedules; 21 years' experience; willing to go anywhere; best of references can be furnished. PW-6, Elec. Ry. Journal, Chicago.

WANTED—To communicate with an electric railway company desiring services of high-class executive in capacity of manager, superintendent or chief engineer; south preferred. PW-28, Elec. Ry. Journal, Philadelphia.

POSITIONS VACANT

ACCOUNTANT or auditor, familiar with light, power, street railway and water accounts; state age, experience, reference, married or single and salary expected. Applicant must be efficient, capable and accurate. Middle Southwest city of 30,000 inhabitants. P-40, Elec. Railway Journal, Chicago.

A WORKING night car barn foreman wanted; salary \$110 per month. Opportunity of advancement for right man. P-30, Elec. Ry. Journal, Philadelphia.

CAPABLE man wanted to look after repair work on a small electric road having nine cars and five miles of trolley. Must be able to wind and repair armatures. State age, reference and salary desired. Goldsboro Elec. Ry. Co., Goldsboro, N. C.

CAR dispatcher for interurban line, capable and experienced in organizing and handling labor. Good pay to right man. P-34, Elec. Ry. Journal, Philadelphia.

COMPETENT track foreman wanted immediately. Must be experienced in street railway work, including electric welding and rail bonding. Salary \$100 per month. Give experience, references, photo, date can report, and all necessary information in first letter. Galesburg & Kewanee Electric Railway Company, Kewanee, Illinois.

Direct Current Belted Generator

1—500 KW., 550 V., 320 RPM., Cp. Wd. Westinghouse 3 bearing direct current generator.

DUQUESNE
Electric & Mfg. Co.

Bessemer Bldg., Pittsburgh

Your Advancement
is largely in
your own hands—it is
doubtful if anyone
else is worrying over it

Better positions are constantly being secured through small advertisements in the "Positions Wanted" Columns

60 cents for 20 words

POSITIONS VACANT

COMPETENT Signal Man wanted for Automatic A. C. Track Circuit Signals and Trolley Contracts. Ft. Dodge, Des Moines & So. R. R. Co., Boone, Iowa.

ELECTRICAL engineer with practical experience in power, light, traction and transmission lines. Good job, good money for capable man. P-36, Elec. Ry. Journal, Philadelphia.

EXPERIENCED car barn and powerhouse foreman. Must be technically educated and know how to handle labor. P-35, Elec. Ry. Journal, Philadelphia.

MASTER mechanic wanted for a large city and interurban property; one of the best opportunities in the country for a first-class, competent and energetic man. Write fully, giving all particulars as to education and experience. P-27, Electric Railway Journal, Cleveland.

NIGHT barn foreman and night controller man wanted for system of 150 cars in Eastern Penna. P-17, Electric Railway Journal, Philadelphia.

ONE first-class electric repairman for steady employment. Young married man preferred. State experience and salary expected. P-26, Elec. Ry. Journal, Philadelphia.

SAFETY expert, experienced in street railway traffic operation wanted by a large city and interurban property. Attractive position for good man. P-37, Elec. Ry. Journal, Cleveland.

FOR SALE

Electric Locomotive

Weight, 88,000 lbs. 4 G.E.-55, 100 H.P. motors, Type M control, straight and automatic air brake, M.C.B. trucks.

ALBANY SOUTHERN RAILROAD
Rensselaer, N. Y.

POSITIONS VACANT

STOREKEEPER, experienced in electric railway materials, capable of taking charge of stock of approximately \$25,000 or acting as receiving clerk for general foreman at a general storehouse. Give age, detailed experience for the last five years, salary expected, and reference in first letter. P-41, Elec. Ry. Journal, Philadelphia.

SUPERINTENDENT transportation wanted for city and interurban operation in Central West. System of two hundred miles. Applications desired only from men thoroughly familiar with every detail. P-39, Elec. Ry. Journal, Chicago.

SUPERINTENDENT wanted to take charge of interurban line and light and power company, Central Pennsylvania. Good salary for right man. Give full particulars as to experience, references, etc. Must be a hustler. P-33, Elec. Ry. Journal, Philadelphia.

WORKING foreman wanted to take charge of Line Work for a Trolley Road of about 30 Miles in Eastern Pennsylvania; one who understands trolley and telephone work; must also be handy with tools. P-19, Electric Railway Journal, Philadelphia.

EMPLOYMENT AGENCIES

Correspondence Service

The undersigned provides a confidential service designed to locate openings through correspondence for men earning not less than \$2,500 and up to \$25,000; all lines. Not an employment service, covering individual negotiations. Established 1910. Complete privacy assured; present connections in no way jeopardized. Send name and address only for explanatory details. R. W. Bixby, H1 Niagara Square Buffalo, N. Y.

WANTED

Rotary Converter

Rotary Converter and Transformers:

300 KW. Rotary Converter: 370 AC, 25 cycle, 600 volt DC.
3—13,200/370 volt, 25 cycle Transformers for above Rotary. State price and delivery.

SOUTHERN NEW YORK POWER & RAILWAY CORPORATION
Cooperstown, N. Y.

FOR SALE

Waycross Street Railway

Are dismantling and offer for sale:

3—Trailers, J. G. Brill, seat 32
1—Flat Car
1—Work Car
9 Miles 00 Trolley with all fixtures
6 Miles 60-lb. Tee Relaying Rail
1—Mile Shanghai Rail
2 Miles Girder and Chair Rail
Also 600 tons 35-lb. rail in West Virginia.

Southern Iron & Equipment Co.
Atlanta, Ga.

SEARCHLIGHT SECTION

IMMEDIATE SHIPMENT

TURBINES

- 1—500 KW. Westinghouse horizontal turbo unit, 3 ph., 60 cy., 3600 rpm.
- 1—500 KW. General Electric Curtis steam turbine, 3 ph., 60 cy., 1800 rpm., 2300 volts, 150 lb. steam pressure, vertical type.
- 1—500 KW. Westinghouse Horizontal Turbo Generating Unit wound for 3 phase, 60 cy., 2300 volts, speed 3600 rpm., condensing duty.

DIRECT CONNECTED ALTERNATING UNIT

- 1—800 KW. Allis-Chalmers, 2300 v., 3 ph., 60 cy., 90 rpm. generator, direct connected to 22 and 44 x 48" Reynolds Corliss engine.

60 CYCLE ROTARY CONVERTERS

- 1—300 KW. West. rotary converter, 3 ph., 60 cy., 370 v., A.O., 575 v., D.C., 600 rpm., with 3—185 KVA. Gen. Elec., 60 cy. transformers, 2200-370 volts.
- 1—200 KW. West. 3 ph., 60 cy., 720 rpm., Rotary Converter, 575 volts D.C., 360/370 volts A.C.
- 1—150 KW. West. 3 ph., 60 cy. rotary converter, 550 v., 720 rpm., with two Scott connected transformers.

ARCHER & BALDWIN, Inc.

114-118 Liberty Street, New York City Telephone 4337-4338 Rector

Gasoline Passenger Car



\$1500 F.O.B.

Ranier
Minn.

Ready to
operate

American Traction Company, Security Building
Minneapolis, Minn.

Receiver's Sale of Electric Railroad Supplies

LEGAL NOTICE

Notice is hereby given that the undersigned, Charles D. Davidson, as Receiver of the property of the Gary and Interurban Railroad Company and of the East Chicago Street Railway Company, pursuant to authority given to him by order of the District Court of the United States for the District of Indiana in the cause entitled "Central Trust Company of Illinois et al vs. Gary and Interurban Railroad Company et al, No. 134 In Equity," will at his office at 800 Broadway, Gary, Indiana, on the

25th day of February, 1918

at ten o'clock, A.M., and from day to day thereafter until sold, offer for sale at private sale for cash a stock of electric railroad supplies consisting of repair parts for the following: GE-205-B motors, Westinghouse 112-B motors, No. 15 Cooper heater, McQuire-Cummings high speed trucks, Westinghouse L-4 control, and other items.

Dated this 23rd day of January, 1918.

CHARLES D. DAVIDSON,
as Receiver of the Gary and Interurban Railroad Company and of the East Chicago Street Railway Company.

85 lb. A. S. C. E. Relays

16,000 tons—with Angle Bars to match. Available immediate shipment and centrally located.

We positively own these Rails and offer same in carload lots and over 25,000 tons—Relays—sizes 25 lb. to 100 lb., in stock our Pittsburgh yards and vicinity.

Immediate shipment guaranteed and prices very attractive.

Carload and less than carload inquiries and orders solicited.

Rails cut to length for structural purposes.

Frogs, Switches, Bolts, Nuts, Spikes and all Accessories.

L. B. FOSTER COMPANY
Park Bldg. Pittsburgh, Pa.

CLEVELAND ARMATURE WORKS

Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years.

RAILS Locomotives, Cars, Machinery, Piling, Tanks

We've got too much
to list here, so we've issued

68 pages BULLETIN 230 Get it now!
ZELNICKER IN ST. LOUIS

FOR SALE VERY REASONABLE

6—Single truck

CLOSED CARS

32' overall; seat 28; Westinghouse 68 motors; K. controllers; in good condition.

Manhattan Bridge Three Cent Line
333 Gold Street, Brooklyn, N. Y.

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SEARCHLIGHT SECTION

can be received until 10 A.M.
Wednesday for Saturday's issue.

CAR BARGAINS

OPEN and CLOSED
MOTOR and TRAIL

Write for Price and Full Particulars to

ELECTRIC
EQUIPMENT Co.
601 Commonwealth Bldg. Phila. Pa.

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry
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Horne Mfg. Co.

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Holden & White, Inc.

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(See also Bearings & Bearing Metals.)
Titanium Alloy Mfg. Co.

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Electric Service Supplies Co.
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Ohio Brass Co.
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Brill Co., The J. G.

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Columbia M. W. & M. I. Co.

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Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
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Western Electric Co.

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Batteries, Storage.
Electric Storage Battery Co.
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Eureka Co.
General Electric Co.
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St. Louis Car Co.
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Holden & White, Inc.

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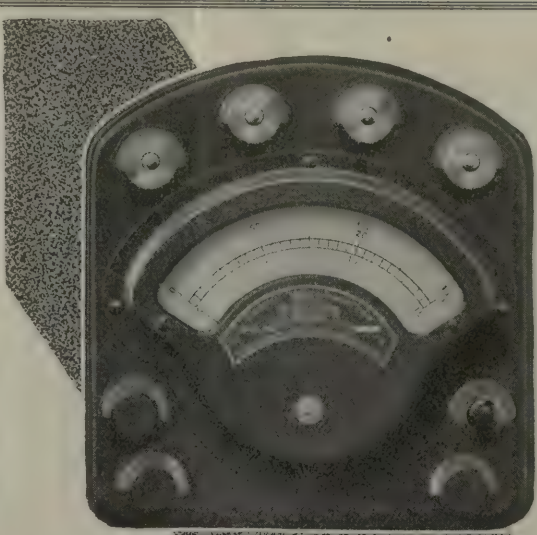
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My name is Shushan.
I am a little Armenian girl.
Do I look much different from an American baby girl?
I was happy until my papa and mama died.
I had nice things to eat and wear; now I am growing blind because I am starving.

I am only one of 400,000 little orphan girls and boys who are starving.

Have you ever been really hungry?
You dear, good, kind, generous Americans will not let us go hungry, will you?

Many thousands of my little friends have already died from slow starvation.

Those of us still alive, but oh, so weak for just bread, can be saved even from the blindness of starvation if we can get help quick.

You will help us, won't you, dear, good, kind, generous Americans?

When American papas and mamas look at their happy little girls and boys—just as I once was, won't they say: "We will give enough money to save the life of a little Armenian or Syrian boy or girl."

Won't you little happy American boys and girls ask your papas and mamas to give you seventeen cents a day to send to us?

That much will keep one of us alive for one day.

There are thousands of other little Armenian and Syrian girls and boys whose papas and mamas are living—

but all of them are starving just as I am.

Everybody here is hungry.
Our pretty homes were destroyed and we were driven across the desert.

My mama carried me to the Relief Station.

She gave me the last of our food and she starved to death.

Yesterday 800 children had to be turned away when the Relief Workers gave us supper; turned away to die because there was not enough food to give to all of us.

The others who are living must be helped.

We sleep on the ground.
Winter is here and it is very cold, but being cold is not nearly so bad as being hungry—and being hungry is not nearly so bad as starving.

The mothers and the tiny babies all around me are starving.

They are weak, but so patient, even when they begin to go blind.

There are 2,500,000 of us who can yet be helped.

Seventeen cents a day apiece is all we ask.

It is enough to keep us alive, but we must be saved—NOW, TODAY.

We pray to God every morning, noon and night asking him to shower you with his blessings so you dear, good, kind, generous Americans can help us.

You will help us, won't you?
Lovingly yours,
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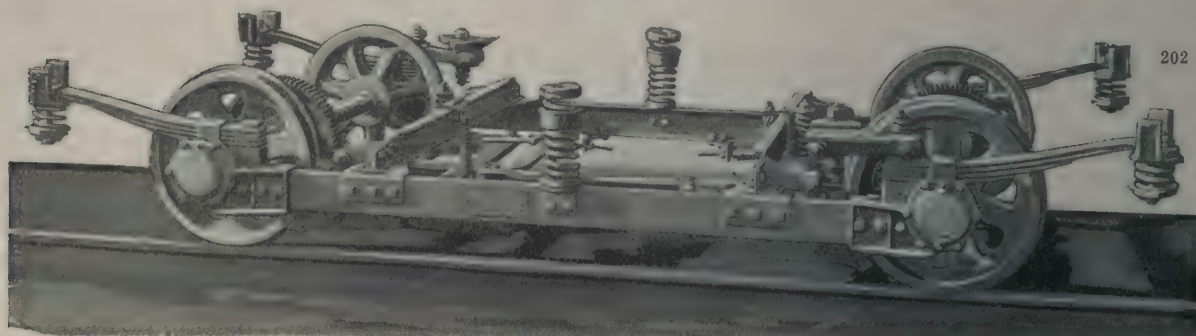
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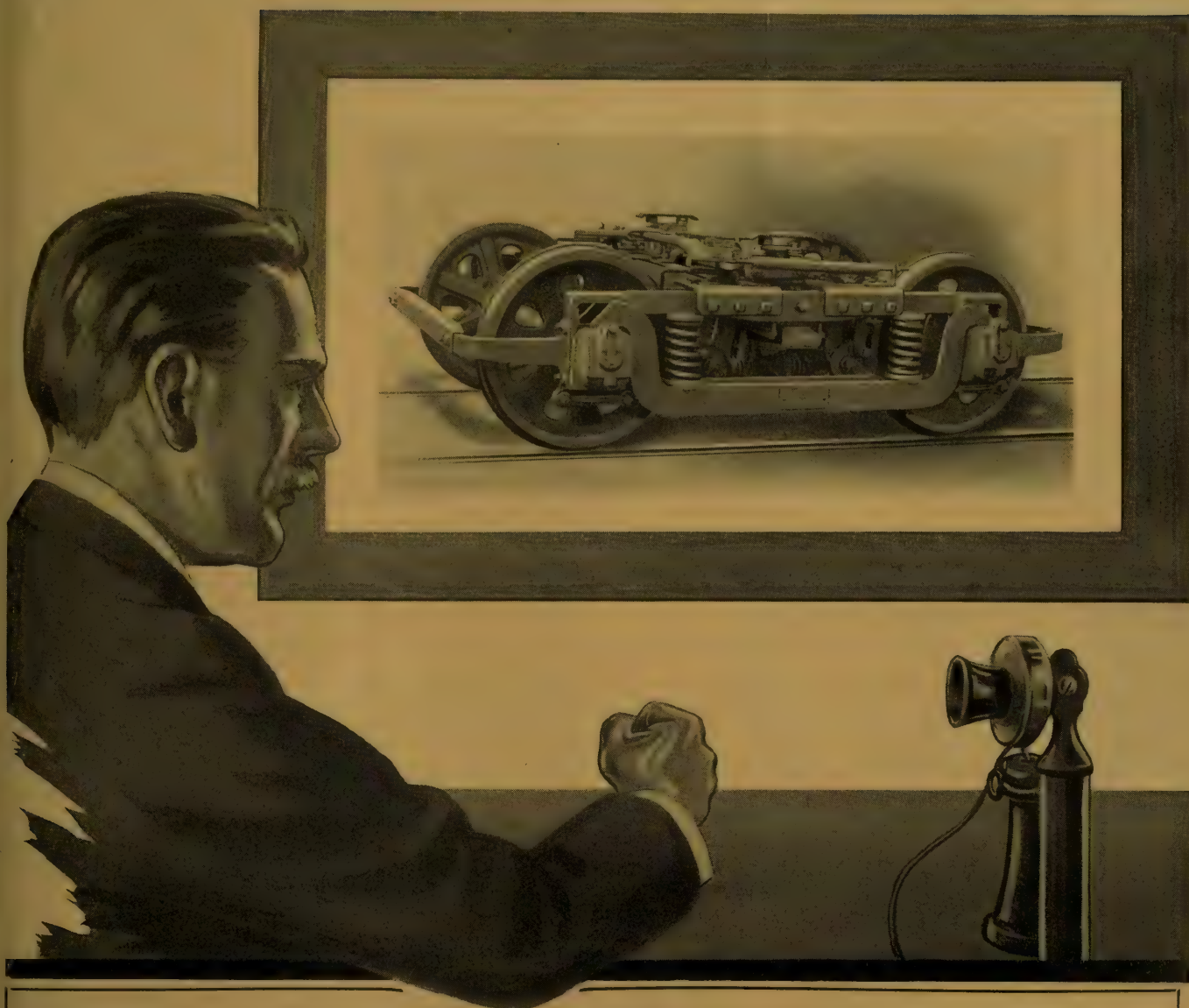
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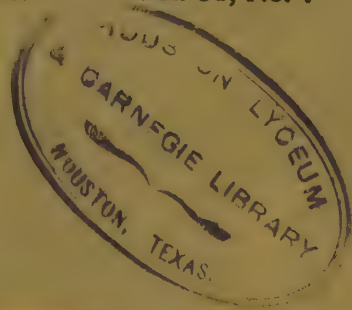
ELECTRIC RAILWAY JOURNAL

New York, February 16, 1918

McGraw-Hill Company, Inc.

Vol. 51, No. 7

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Gurney Ball Bearings from Tampa to Bellingham

Three weeks ago we showed a Gurney-equipped Birney Car in service at Bellingham, Washington. The picture on this page shows one of these cars in service at Tampa, Fla.

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Gurney Ball Bearing Co.

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Electric Railway Journal

H. W. BLAKE, *Editor*

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For All Voltages
up to 750 Volt
Direct or Alternating Current

For Railway
Lines and
Cars

One or two MP Arresters mounted on each car give ample protection under ordinary conditions.

Auxiliary protection should be provided by mounting MP Arresters on the line, about five to the mile.

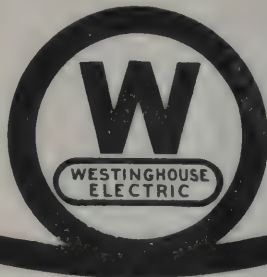
The line arresters relieve the car arresters from excessive duty by discharging from the line, so that complete protection is more nearly assured to the apparatus on the car.

MP Arresters have the lowest equivalent gap and the maximum discharge capacity of any arrester for similar service, except the condenser and electrolytic types.

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Not a tension pull—Not a break in TEN YEARS' service on The Denver & Interurban Railroad

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That's why we feel we can add nothing to this report from the 11,000-volt single-phase Denver & Interurban Railroad:

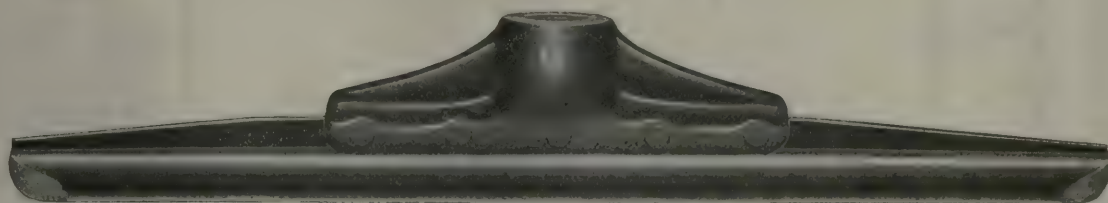
"In regard to the Phono-Electric Wire used, it may be interesting to know that on 47 miles of catenary construction it has never been necessary to make any additional tension pulls

in trolley since original installation; also there has never been a break of the trolley wire in this line and not a foot of new wire installed except at a point where wire was kinked, caused by sleeve giving up. Pantographs in use on this service are of $\frac{1}{8}$ in. mild steel, 4 in. in width, are maintained at a pressure of 12 to 18 lbs. at the wire and giving the life of 25,000 to 35,000 miles."

Bridgeport Brass Company
Bridgeport Connecticut



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O-B Extruded Trolley Ear

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generous
amount of metal
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perfect
wheel clearance

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Kanawha Street

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Elreco Poles Can Never "Telescope"

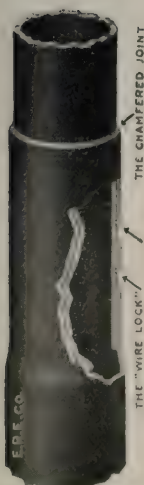
because the "Wire Lock" Swedge Joint absolutely prevents slipping, while retaining the full strength of the walls. The Chamfered Joint is an effective bar to the entrance of water—the joint can never rust.

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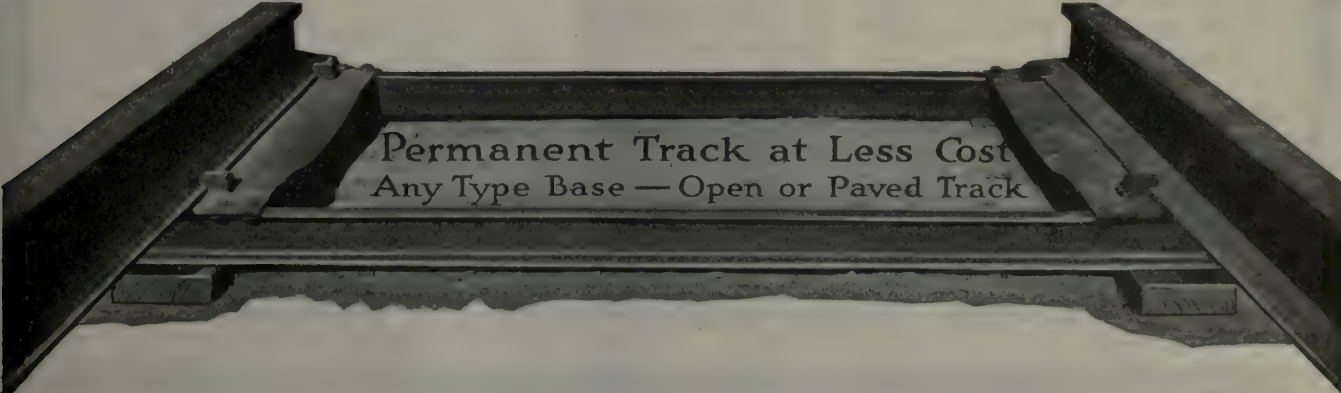
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Any Type Base — Open or Paved Track



The Best Oil—By Far!

THE creosote oil that made possible your modern wood block pavements was first produced by this company. And today more than one-third of all the wood block pavements in this country are preserved with Reilly oils.

Now we offer a new product—Reilly's Improved Creosote Oil—by far the best oil ever produced. Made by a new and patented method. An oil so superior to other products that it contains more than three times the permanent constituents of the next best oil.

Without an equal for treating wood blocks, railroad ties, telephone cross

arms, under-ground and under-water timbers—any wood that is to be preserved by the empty cell process.

Contains no trace of coal tar or other impurities. In your distilling test you will find that more than 75% remains at 315 degrees Centigrade.

It stays in the wood forever.

Prompt Shipments!

Under present conditions our large stock and prompt shipping facilities are exceedingly important. We can fill your orders promptly at any of our refineries. Samples gladly submitted.

Reilly's Wood Preservative Oil

is our best product for open tank or brush treatment. A high-boiling anthracene oil—limpid and free-flowing at working temperatures. Contains no adulterant or volatile products.

Send for Sample

Treated Timbers!

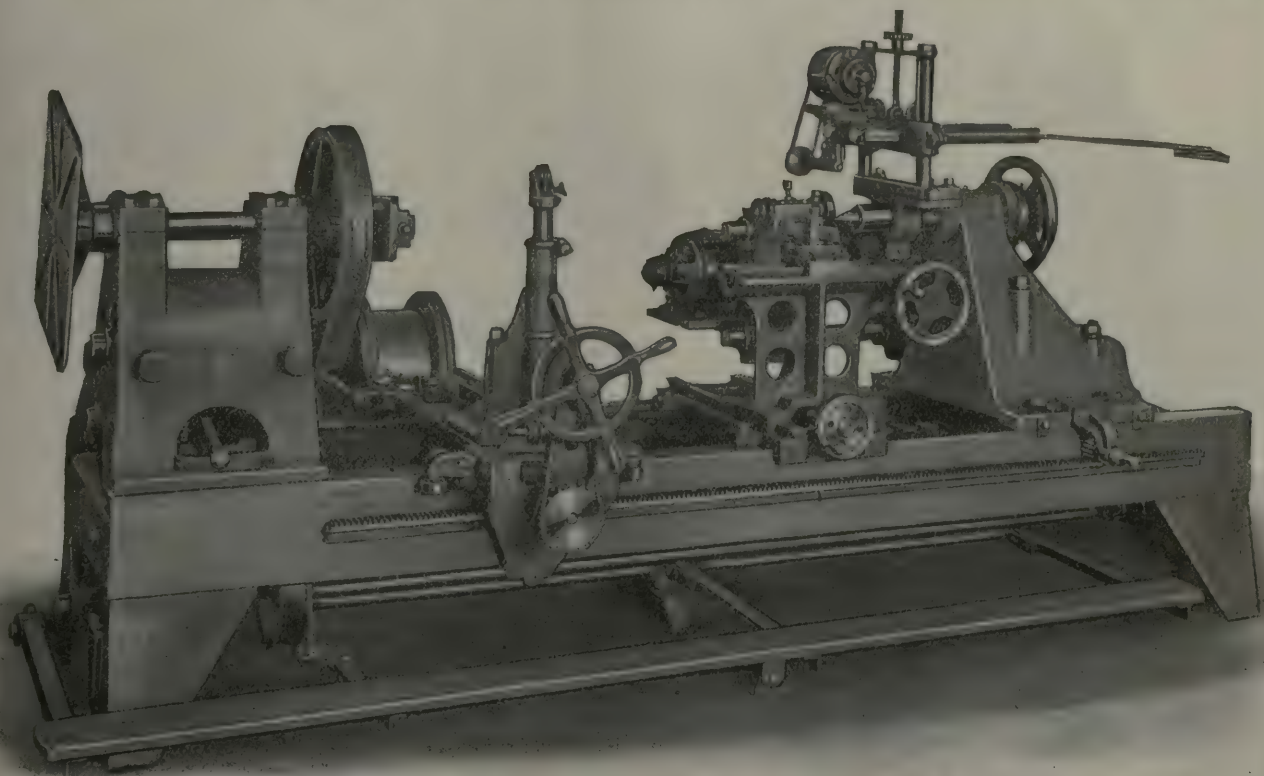
If you are not in position to treat your own ties and dimension timbers we will be glad to submit attractive prices. Tell us your requirements in this line. We will take care of you.

Republic Creosoting Company

Plants: Indianapolis—Minneapolis—Seattle—Mobile

Indianapolis, Indiana

Many are buying this great machine to cut down Armature Repair Costs



No. 19409 Peerless Heavy Duty Universal Armature Machine, consisting of Banding Machine, Commutator Slotting Machine, Commutator Grinding Machine, Commutator Turning Machine and Field Coil Winding Plate

Heavy Duty Armature Machine—

This heavy duty universal armature machine consists of a banding machine, commutator slotting and commutator grinding machine and a field coil winding plate. With one installed in your shops you could first wind your coils; put them in the slots and solder to commutator bars; band with wire that is maintained under even and uniform tension; on a machine that is under perfect control of the operator at all times; on a machine which, when stopping automatically, locks and absolutely prevents slack in the band wire by any back-lash of the armature. And, finally, grind and slot your commutator. An armature completely repaired on one machine—think of the great reduction of repair costs that would follow.

It will cost you nothing to find out more about this machine. Write for further information.

Write for Special Catalog Now

ELECTRIC SERVICE SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church St.

CHICAGO
Monadnock Bldg.

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto, Winnipeg



How easy it is to let the cars go by when using
The ERICO Portable Welder

Here we are at the suburban end of a city line.

Cars come along every few minutes.

But the Erico Portable Welder doesn't make them lose a minute.

Because it's no trouble to lift quickly off of the rails the 65-lb. welder and the 140-lb. rheostat.

This light outfit will be popular with the traffic department as well as with the line department, because cars will not be detained.

Try it and see for yourself.

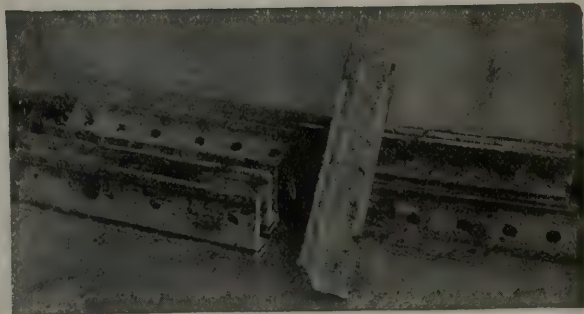


The Electric Railway Improvement Co.
Cleveland, Ohio



They Used To Scrap These Angle Bars

Now they save
\$1.25 on each by
reclaiming them
with a



A typical shop repair job made by a Lincoln Arc Welder.

Lincoln Arc Welder

Sufficient metal is welded onto the top to make good the wear, and the bars were then planed down smooth.

All over the United States Lincoln Arc Welders are helping to conserve our metal supply and to solve transportation problems.

They are saving street railway companies thousands of dollars yearly in track and shop repairs. They can help you just as readily as they help others.

Write for our booklet No. 104-J and see what you'll save when you get a LINCOLN.

The Lincoln Electric Co.

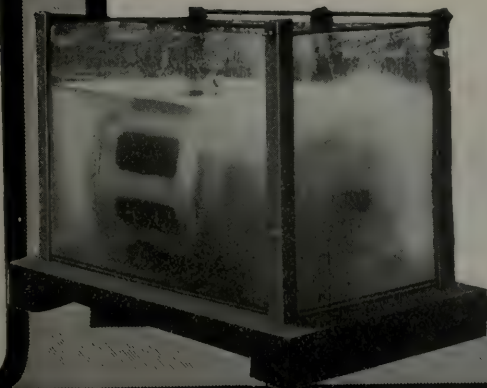
Cleveland, Ohio

New York City
Buffalo
Syracuse
Boston

Chicago
Columbus
Detroit
Pittsburgh

Philadelphia
Charlotte, N. C.
Toronto
Montreal

Agencies in Other Principal Cities





**THERMIT
INSERT
WELDS**



**OUTLAST
THE
STEEL
RAILS**

THERMIT

is the strongest and most dependable connection between rails. This is not merely a statement made off-hand—to impress the superficial reader—but the gist of results at Los Angeles, San Antonio, Youngstown and other cities where the Thermit Insert Weld has produced a truly continuous rail under wide variations of service, weather and substructure.

METAL & THERMIT CORPORATION

Successors to Goldschmidt Detinning Co. and the Goldschmidt Thermit Co.
120 BROADWAY, NEW YORK

329-333 Folsom St., San Francisco
7300 So. Chicago Ave., Chicago

103 Richmond St., W., Toronto, Ont.
1427-1429 Western Ave., Pittsburgh, Pa.

Factories located at Chrome, N. Y.; Wyandotte, Mich.; East Chicago, Ind.; Jersey City, N. J.



Northwestern Pacific R. R. installs “Armco” Iron Culverts

The photograph shows how the “Northwestern” safeguards its roadbed in tough ground. This view was taken before the track was laid.

Soil conditions were exceptionally difficult on this construction. In many places it was impossible to secure stable foundations and on slopes the shifting and sliding subsoils made masonry construction out of the question.

“Armco” Iron Corrugated Culverts met this situation exactly. They stood up perfectly under conditions which would mean destruction to any other type.

“Armco” Iron is the purest and most even of irons, consequently it has the highest rust-resistance and the longest service life.

Write to the nearest Manufacturer for full information on Rust-Resisting “Armco”



Resists Rust

Iron Culverts, Signs, Sheets, Roofing and Formed Products.

Arkansas, Little Rock
Dixie Culvert & Metal Co.
California, Los Angeles
California Cor. Culvert Co.
California, West Berkeley
California Cor. Culvert Co.
Colorado, Denver
R. Hardesty Mfg. Co.
Delaware, Clayton
Delaware Metal Culvert Co.
Florida, Jacksonville
Dixie Culvert & Metal Co.
Georgia, Atlanta
Dixie Culvert & Metal Co.
Illinois, Springfield
Illinois Corrugated Metal Co.
Indiana, Crawfordsville
W. Q. O'Neill Co.
Iowa, Des Moines
Iowa Pure Iron Culvert Co.

Kansas, Topeka
The Road Supply & Metal Co.
Kentucky, Louisville
Kentucky Culvert Co.
Louisiana, New Orleans
Dixie Culvert & Metal Co.
Maryland, Baltimore
Wm. M. Baker, Munsey Building
Massachusetts, Palmer
New England Metal Culvert Co.
Michigan, Bark River
Bark River Bridge & Culvert Co.
Michigan, Lansing
Michigan Bridge & Pipe Co.
Michigan, Bay City
U. S. Bridge & Pipe Co.
Minnesota, Minneapolis
Lyle Corrugated Culvert Co.
Minnesota, Lyle
Lyle Corrugated Culvert Co.
Missouri, Moberly
Corrugated Culvert Co.
Canada—Canada Ingot Iron Co., Ltd.,
Guelph, Sherbrooke, Winnipeg, Calgary.

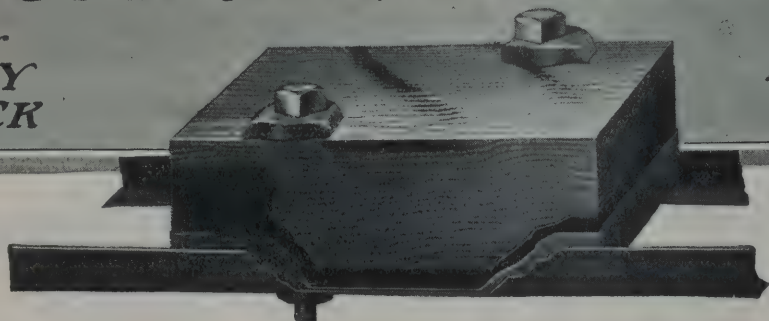
Montana, Missoula
Montana Culvert & Flume Co.
Nebraska, Lincoln
Lee-Armet Co.
Nebraska, Wahoo
Nebraska Culvert & Mfg. Co.
Nevada, Reno
Nevada Metal Mfg. Co.
New Hampshire, Nashua
North-East Metal Culvert Co.
New Jersey, Flemington
Pennsylvania Metal Culvert Co.
New York, Auburn
Pennsylvania Metal Culvert Co.
North Dakota, Wahpeton
Northwestern Sheet & Iron Works
Ohio, Middletown
American Rolling Mill Co.
The Ohio Corrugated Culvert Co.
Oklahoma, Shawnee
Dixie Culvert & Metal Co.
Oregon, Portland
Coast Culvert & Flume Co.

Pennsylvania, Warren
Pennsylvania Metal Culvert Co.
South Dakota, Sioux Falls
Sioux Falls Metal Culvert Co.
Tennessee, Nashville
Tennessee Metal Culvert Co.
Texas, Dallas
Wyatt Metal Works
Texas, El Paso
Western Metal Mfg. Co.
Texas, Houston
Lone Star Culvert Co.
Utah, Woods Cross
Utah Corrugated Cul. & Flume Co.
Virginia, Roanoke
Virginia Metal & Culvert Co.
Washington, Spokane
Spokane Culvert & Tank Co.
Wisconsin, Eau Claire
Bark River Bridge & Culvert Co.

The MECHANICAL RAILWAY TIE

*For
CITY
TRACK*

*For
INTERURBAN
TRACK*



Consider the Asphalt Cushion Feature and Its Value to You

The asphalt cushion which serves as an insulator against vibration in Mechanical Railway Ties combines several well defined virtues.

In the first place, it means increased life for the tie itself. It means preservation of the rail. Smooth running and elimination of jolt and jar retard crystallization and wear and do away with battered joints. It preserves the paving by holding the rails to surface. It reduces hardship to equipment due to vibration, and it conserves power due to smooth running and solidity. It reduces noise and this, added to the minimized vibration, means better comfort to patrons.

Our reply to your request for details will set you to thinking of Economy from a new angle. Write.

M*echanical Railway Ties are easy to install, cost little to maintain, are as permanent as the concrete in which they are embedded and are unapproachable from the service standpoint. Their first cost is moderate. Their "last cost" is lower by far than that of any other tie.*

THE DAYTON MECHANICAL TIE CO.

201 Third Street Arcade
DAYTON, OHIO

Provides the Desirable Qualities of Wood Plus the Strength of Steel, the Permanence of Concrete and the Resiliency of Asphalt—A NonConductor of Vibration

What is the Annual Premium of your Insurance?

What is the Annual Retainer in your Legal Department?

They are both necessary and justifiable overhead and carrying charges if you never have a Fire or Litigation, because *you are Prepared and Protected.*

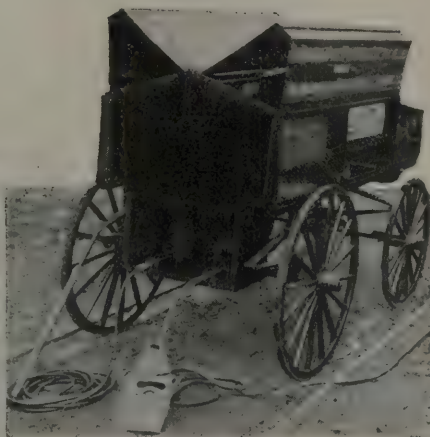
Compare these amounts with the carrying charges of a piece of equipment that will insure you against delays in operation—and when used will save Hundreds and possibly Thousands of Dollars in a Few Minutes—and with little expense. It is the

Indianapolis Portable Electric Welder

6% interest on original investment of \$500.00....	\$30.00
Annual renewals to cables and insulation, estimated, \$10.00—say	20.00
Depreciation 5%—say 10%	50.00
Total per annum.....	\$100.00

**27½ cents per day keeps you
prepared and protected against
emergencies**

In these times the welder
will save more than \$100
every day it is used.

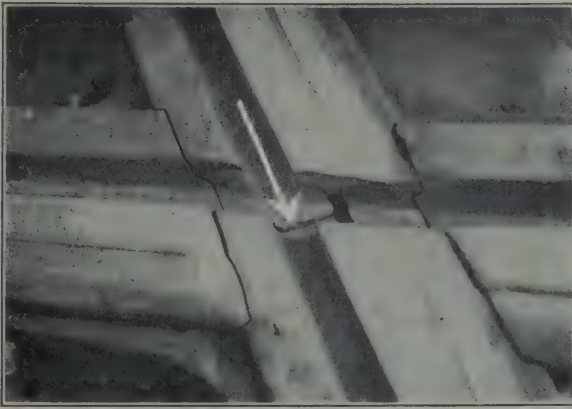


Cost of Operating—

Labor, Current and Steel
from 1% to 10% of the
Value of Reclamation.

Average cost of Labor
and Current to apply
one pound of steel 20 to
25 cents.

Indianapolis Switch & Frog Company, Springfield, Ohio



What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill articulated cast-manganese crossing the difficulty is

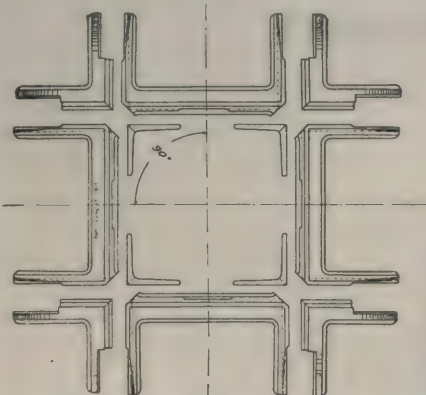
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

**Order Balkwill Articulated Cast Manganese Crossings
Direct from Your Special Work Manufacturers**

The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio

Business
in the
Electric Railway
Field

ANNUAL MAINTENANCE NUMBER—MARCH 16

Business in the Electric Railway Field depends very largely, nowadays, on the fact that self-preservation compels electric railway men to pay strict attention to

1—Maintenance

2—Fuel Saving

3—Labor Saving

At this time interest in these subjects because of the war is particularly keen.

Therefore, the

Electric Railway Journal
Annual Maintenance Number

ANNUAL MAINTENANCE NUMBER

—will this year also be a

Fuel and Labor Saving Number

combined with the paper's newest
extension of service:

The Monthly Mechanical Edition

March 16, 1918

This issue will publish most important articles of lasting value on power generation, transmission and distribution, track, car design and materials, car equipment—each treated from the fuel and labor saving viewpoint.

The issue will definitely refer to and describe classes of apparatus, materials, etc., which can help its readers save fuel, labor and maintenance expense.

For these reasons, the 1918 Maintenance Number provides—

An Advertising Opportunity of Unique Value

Never before has the field had a publication which so clearly meets the needs of the hour. This issue will not only be read, but re-read, passed around, discussed, filed and referred to for many, many months to come.

Combined with the regular Monthly Mechanical Edition, the March 16 Fuel and Labor Saving Issue will have

1,500 Extra Circulation

Total Circulation

8,800 Copies

Will cover the field from A to Z. In spite of extra value thus offered regular advertising rates apply. Every manufacturer who does business with electric railways or hopes to do business with them in the future will find it a wise investment to

Use a Double Page Spread

or at least a full page in this March 16 issue. We are ready to prepare a special piece of copy, but must have notice at once because

Cuts and Copy

should be in by March 6

Copy received with cuts before March 2 can be set in time to submit proofs.

At least send in your space reservation now so that we can place your advertisement advantageously in the tentative make-up. The choicest positions go to the promptest advertisers.

Do you want us to plan

A double-page spread?

Or a full page?

You can wire at our expense.

Electric Railway Journal

4 Tenth Avenue at 36th Street

New York

Member Audit Bureau of Circulations

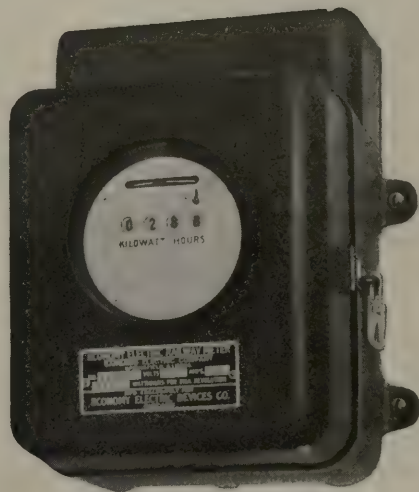
ANNUAL MAINTENANCE NUMBER—MARCH 16

97 Cents per Year!

*That's the
Maintenance Cost of*

The ECONOMY Meter

"The Watchdog of Your Power"



That's all it has cost the Tri-City Railways to maintain 100 of these meters over a period of nearly three years.

Although not the most important factor, nevertheless **UPKEEP** is a vitally important consideration in connection with a proposed installation of metering devices for the saving of electrical energy at the motors.

We therefore invite your earnest consideration and comparison of these figures of 97 cents a year maintenance cost and urge it as

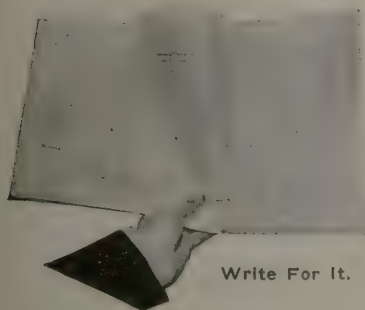
one of the decided advantages in favor of the **ECONOMY** Meter.

Another is the fact that by our system you meter the energy **ACTUALLY CONSUMED** and that's precisely where the saving can be and should be effected.

The readings of our meter yield the exact information desired. Thus the motorman learns through experience the most economical method of handling his car—when to accelerate, when to coast and when to brake.

And the operating department readily acquires the information necessary to the working out of the most economical schedules.

ECONOMY Meters will quickly pay for themselves by the power saving they induce. You will find our literature on this subject highly informative. Our bulletin, "The Economical Operation of Electric Railway Cars," sent on request.



Write For It.



ECONOMY



ECONOMY ELECTRIC DEVICES CO.

EXCLUSIVE SALES AGENT
Sangamo Economy Railway Meter
OLD COLONY BLDG. CHICAGO

The Truth About the So-Called "Subsidy" in Second-Class Postage Rates

A subject of vital concern to every business man.

In the last Congress a bill was passed the avowed purpose of which was to force publishers of certain classes of periodicals to pay what is claimed to be the cost of transporting and delivering such periodicals under second-class postal rates.

Under this bill, for the purpose of "adjusting" second class mail rates the United States is divided into various rate zones.

The glaring inaccuracies and injustices of this bill may be best understood by considering the following point among many of similar character.

Why Is Second Higher Than Third-Class Rate?

Under this bill a maximum rate for second-class matter of 10 cents a pound is reached, while the maximum rate for delivery of third class (substantially the same character of material) anywhere in the United States is only 8 cents a pound.

In other words the Post Office Department will collect in San Francisco 8 pamphlets or catalogues weighing 2 ounces each, or 1 pound in all, handle and deliver those 8 separate pieces to 8 *separate* addresses in New York City for a charge of 1 cent on each, or 8 cents total charge for 1 pound in 8 *separate* deliveries, while for a single piece of second-class matter weighing precisely the same (one pound) under one wrapper, requiring only one handling and only one delivery it will charge 10 cents. And this in spite of the further fact that the Post Office at San Francisco will collect the 8 pieces of matter from any point in the city, while the second-class matter is delivered at the Post Office by the publisher, its collection costs the Post Office Department nothing.

The Basic Weakness

This same lack of logic is still more strikingly shown in the basic argument advanced in favor of the bill. An argument which has been accepted as logical by the average man simply because the average man has given the subject little thought and has little or no information upon which to base conclusions.

The backbone of the argument in favor of the bill is this: second-class matter costs the Government more to deliver than the rate now charged: the only persons who ship second-class matter and pay second-class postage are publishers: therefore publishers are the persons who profit by a lower rate and the present one cent a pound rate is a subsidy to publishers: this subsidy is equivalent to the difference between what second-class matter costs the Postal Department and what the Department receives from that class of matter.

To put it baldly, this bill is based on the argument that the Post Office loss is the publishers gain and that this loss swells the profits of a certain class of publishers.

Never was there a more plausible, reasonable and apparently logical, presentment of a hollow and totally indefensible contention.

That there is a "subsidy" granted by the Government in a low second-class rate may be true. But the claim that this "subsidy" works to the profit of publishers is the most arrant nonsense.

Benefit of Low Rate Goes To Public

Whatever there is of "subsidy" goes straight to the people—to the consumer—to the persons who buy and use the product of the publisher.

Are the great free circulating libraries in our cities granting subsidies to book publishers by distributing books to readers absolutely free?

In this latter case there is a free service in the distribution of literature, precisely as there *may be* a free service in the distribution of literature under second-class mail rates, but the publisher is not "subsidized" in either case. It is in both cases the reader—the consumer—the final user of the service, who gets the benefit—not the producer of the commodity.

If low carrying and delivery rates form a subsidy for the producer then it follows that low railroad freight rates are a subsidy to shippers. Are they?

The relatively low rate on second-class mail is no more a subsidy to publishers of periodicals than a relatively low freight on furniture would be a subsidy to manufacturers of furniture. In both cases the benefit goes to the ultimate consumer.

A National Press Breeds National Progress

No man is wise enough to calculate the enormous advantages which have accrued to the American people by the cheap and therefore universally available fund of literature which is a unique characteristic of our national life. A literature which is not merely broadly educational and inspiring but which through its highly specialized channels such as farm papers, scientific papers, educational papers, business papers and similar specialized service is an invaluable means to progress in invention, manufacturing, chemistry, agriculture, and every channel of productive business and professional activity.

The contemplated increase in second-class postal rates is in reality and in fact an enormous tax upon this great educational service.

It is a tax which will tend to stultify progress, slow up improvements in production, and retard the growth of knowledge in every direction. No tax could be levied that could be more harmful to American commerce or to national unity of thought, expression and action.

Will you as an American business man, perceiving the dangers of this tax, write to your Congressman and Senator urging the repeal of this bill?

McGraw-Hill Co., Inc., New York

Publishers of { Power Coal Age
Electrical World
American Machinist

The Contractor
Electrical Merchandising
Engineering News-Record

Electric Railway Journal
Engineering and Mining Journal
Metallurgical and Chemical Engineering



In Bonnie Scotland There's a Lassie at each end of the Car

On the famous Glasgow Corporation Tramways women have made good at both ends of the platform—1360 conductresses and 400 motorwomen.

With America's heavier cars, higher speeds and vestibuled platforms like success would be doubtful if dependence was placed upon operation by hand.

But such doubtful dependence is unnecessary because for a moderate sum per car you can equip your rolling stock with

National Pneumatic Door and Step Control

Thereby enabling you to choose platform operators not on the basis of strength but on the basis of availability, intelligence and courtesy.

NATIONAL PNEUMATIC COMPANY

50 Church St. New York



515 Laflin St. Chicago



MONEY TALKS

for INTERNATIONAL Accuracy

Two years ago the Boston Elevated Railway began the use of International Motor-Driven Station Registers.

To date it has ordered eighty-nine of the straight motor-driven type for heavy service and thirty-eight of the turnstile and register combination for lighter service where one employee serves as change-maker and coin-inspector.

The unvaryingly satisfactory service

which has led the Boston Elevated Railway to standardize on these International equipments for prepayment service at stations is indicated by the following table for the first nine months:

Amount registered.....	\$3,694,305.06
Amount received.....	3,693,684.15
Difference due to 'mutilated coin, non-current, etc.....	620.91

Less than one-fiftieth of 1 per cent.

As most of the mutilated non-current coin is redeemable at the sub-treasury, it is correct to assert that the International Motor-Driven Station Register

Registers all Current Coin with Absolute Accuracy

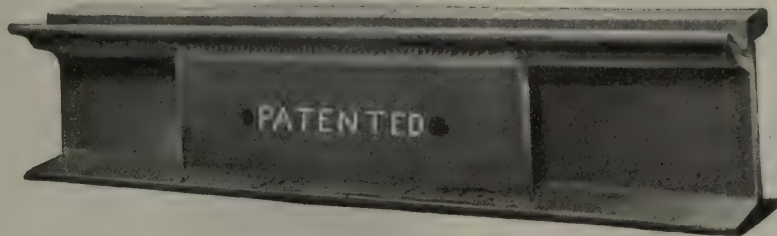
The International Register Company

15 South Throop Street, Chicago, Ill.

Do You Contemplate Installing Gailor Welded Joints?

If not it will pay you to investigate

These joints can be produced with mechanical plates you have on hand or from bar steel easily procurable at any time, and they cost less than the usual mechanical, copper bonded joint.



They can be applied in about one-quarter the time required with any other method of welding and with less than 7 K.W. hrs. per joint. They can be installed without interruption of traffic or nuisance to the public.

They provide permanent conductivity and full support to the head of the rail for the entire length of the plates. They are the only arc welded joints fully protected by basic patents.

For detailed proposition to obtain the advantages of these joints write us or our nearest agent.



Trade Mark

**ATLANTIC WELDING
COMPANY**
30 CHURCH STREET
NEW YORK



Trade Mark

AGENTS

Chas. N. Wood Co., 14 Federal Street, Boston, Mass.
Railway Trackwork Co., 30th & Walnut Sts., Phila., Pa.
The Elec. Engineering & Mfg. Co., First Nat. Bank Bldg.,
Pittsburg, Pa.

Holden & White, Inc., 343 S. Dearborn St., Chicago, Ill.
Wigmore Hall & Co., Pacific Elec. Bldg., Los Angeles, Cal.
Lyman Tube & Supply Co., Ltd., Montreal, Can.



There is More Than One Way to Kill a Pig

You can do it with a shell from a 42 Centimeter gun or you can do it with a sharp knife. Both methods are equally effective. But the knife is a lot simpler and cheaper.

There is also more than one way to record motormen's efficiency in car operation with a view to saving power and equipment.



Showing recorder location on one of the 1200 cars of the Connecticut Company

The Arthur Power-Saving Recorder

does the job economically and effectively by enabling you to teach your men how to operate properly and to check up on them to see that they do it.

The Arthur Recorder accurately indicates the number and duration of brake applications. If such applications are on the average excessive—if one operator on the same run is braking more than another—it demonstrates that an excess of power is being taken out of the car at the brakeshoes and consequently, of course, that an excess of power is being put into the car.

To make a good record on the Arthur Recorder the motorman must operate his car in accordance with the best rules. And that means not only economy of power and reduction of wear on equipment but also maximum safety and the best service to the public.

Ask us for complete data.

The Arthur Power-Saving Recorder Co.
New Haven, Conn.

"Power wasted is the true measure of the motormen's relative efficiency."



BALTIMORE has managed to jump into the limelight at the most unexpected moments during the last two centuries. Originally nothing but a small fisherman's village, it soon grew into an important seaport, protected by powerful forts.

It was near Baltimore

on a British war ship, that Francis Scott Key wrote "The Star Spangled Banner" while the British fleet attacked the forts in 1814. And in April, 1861, the name of Baltimore was on every lip as a result of the street fighting which took place there when the 6th Massachusetts Volunteers passed through the city.

Because of its splendid transportation facilities, its proximity to mines, to the ocean and to some of the best farm lands in the world, Baltimore soon attracted thousands of home-

seeking families, and its fame spread throughout the land as a city worth while to visit.

So many political conventions were held there in the decades after the Civil War that it became widely known as The Convention City.

Multiplicity of conventions is good business for the railways of any city but it also entails obligations of service that must be met, just as the use of

Galena Oils

for 80% of the lubrication requirements of the electric railway field has been justified by the guaranteed results produced through Galena Service.

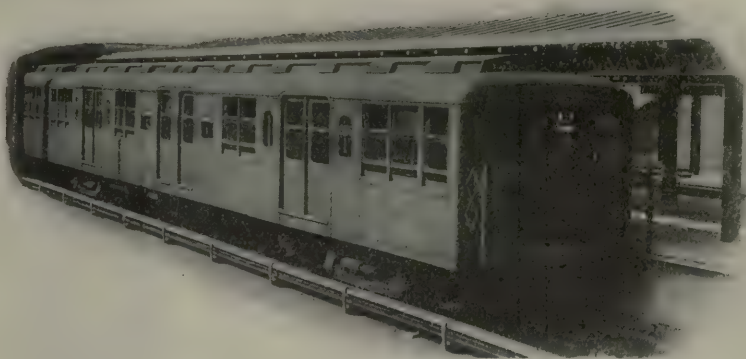
Galena-Signal Oil Co.
Franklin, Pa.

The
QUALITY
Mark



The Tool Steel Gear & Pinion Co.
Cincinnati, O.

Why Brooklyn's Rapid Transit Trains are Equipped with



Rico Coasting Recorders

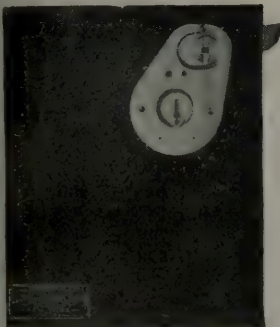
The following extracts from the B. R. T. Monthly for January, 1918, show that the officials of the Brooklyn Rapid Transit System are very much awake to the need for saving coal.

Says John J. Dempsey, Vice-President:

"Proper and economical operation requires a motorman to use his brake as seldom as possible consistent with safety, and to COAST as long and as frequently as possible, consistent with his schedule."

Says C. E. Roehl, Electrical Engineer:

"Coal saving can be accomplished by proper handling of controller and brakes, by COASTING to the fullest extent possible, by avoiding application of brakes while the power is turned on and by avoiding all unnecessary stops."



Says William Siebert, Superintendent of Surface Transportation:

"If each motorman on each trip COASTS an additional 250 feet it would mean a daily saving in power consumed equal to the amount of power it would take to operate a car 8,350,000 ft. or 1581 miles."

Coasting

Time is the Essence of Railroading

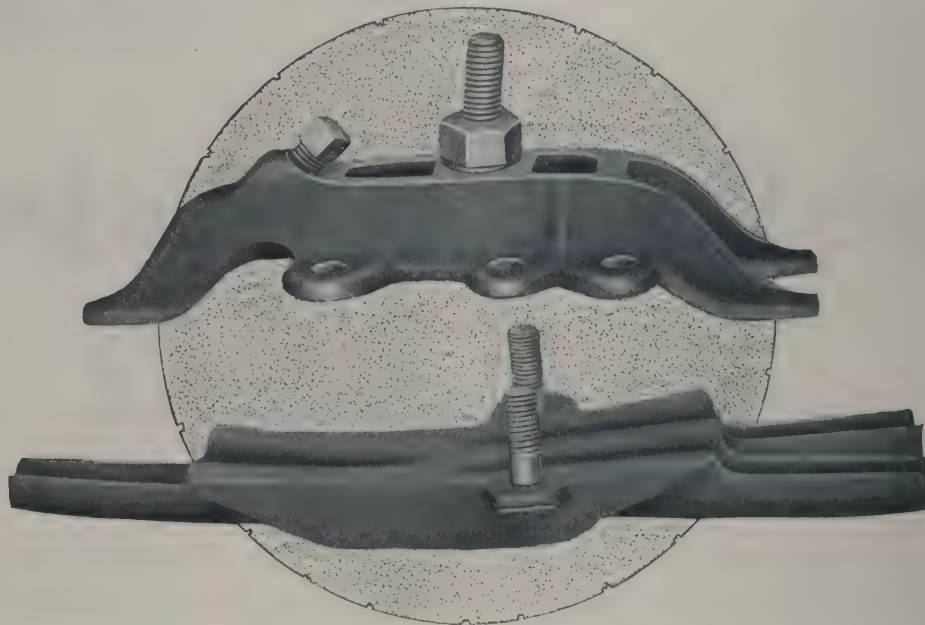
RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK

Trolley Frogs

With Renewable Wearing Pans




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Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

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First Beeler Unit Report Mutually Acceptable

THE announcement that both the Public Utilities Commission of the District of Columbia and the Capital Traction Company have found acceptable every one of the ten recommendations made by John A. Beeler in his first unit report on Washington traffic augurs well for the reception of later units. This report, as noted in the issue of Feb. 2, recommended for the congested district in Fifteenth Street, between Pennsylvania and New York Avenues, a one-half reduction in stopping places, double berthing, safety zones, front-end fare collectors, one-way traffic streets and other means of relief. Mr. Beeler is certainly to be commended for his constructive aid. Traffic reports suggesting such concrete practicable remedies for congestion are invaluable.

Just as the mouth of a river imperceptibly but surely fills up with silt until navigation is impossible, so is the traffic flow of a railway imperceptibly but inevitably impaired by increasing the number of stops here and there, allowing automobiles to park at new locations, ignoring the day-by-day growth of other vehicular traffic and so on. And as navigation can be restored to the river only by the radical use of a dredge, so can circulation be restored to an electric railway only by radically reducing the elements that impede car movement.

A municipality and its railway system are so intertwined that one cannot be highly efficient without the co-operation of the other. Washington is fortunate in having pointed out to it so clearly the points on which its co-operation is needed in order to insure more efficient transportation service. All it needs to do is to help.

Regulation in New York Has Not Broken Down

HAVE the Public Service Commissions in New York State outlived their usefulness? An answer seems unnecessary. But Senator George F. Thompson thinks that they have, and he, as public utility men know, is a fearless, eagle-eyed investigator of regulatory conditions! His choice of evidence, however, is not always happy. For instance, his remark in Albany last week that each commission is paid practically as much as the State Senate costs might lead some one to observe, without of course having any particular senator in mind, that the comparative salaries would often be a good indication of relative values.

What legislators in Albany seem prone to forget is the fact that the work of the commissions has been hampered sometimes by the appointment of men who gave only part-time to the work, or by the delay of the Governor in filling vacancies or the Senate in confirming

appointments. According to Mr. Van Santvoord, who has just retired from the chairmanship of the Second District Commission, such delays have resulted in a serious piling up of cases. He suggests that the law should be modified to compel the Governor to send nominations to the Senate at least thirty days before the expiration of the terms of the outgoing commissioners. This would place the burden fairly on the Senate and would in general tend to promote continuity and dispatch in regulation.

The Senate might try to play politics and delay confirmation. Its record is not altogether commendable on this point. But if the Governor's appointments are wisely made, most of the work is done. Technical training is desirable for the members of a commission, along engineering, legal, financial and accounting lines, but we do not believe that a commissioner should be appointed solely for his technical ability. He must primarily have a judicial mind, fairness and competency as an investigator, fearlessness and honesty.

Good men are doubtless hard to secure, but it is part of the Governor's job to find them. They may be his political friends; they may be unknown to the politicians or to the public at large. These points are often raised by carping critics, but they are not vital. The only important question is—have the men under consideration the desired training and character? If so, they deserve appointment; if not, they don't.

The Old Order Changeth, Giving Place to the New

PERHAPS the steam railroad problem, so pressing at this moment, can be solved by the application to it of the principle underlying the partnership agreement between New York City and its rapid transit lines. This suggestion, made by Theodore P. Shonts before the Detroit Board of Commerce on Feb. 5, is of vital importance to the electric railway industry as well as the steam carriers. If the partnership idea is worth extending to the national transportation lines, it is worth applying in a much wider way to electric railways.

Mr. Shonts, from his intimate acquaintanceship with the dual contracts in New York City, speaks as an authority when he says that these embody principles that are capable of extension. Under the partnership idea utilities are able to secure the private capital which they need and the community to enjoy the benefits from any unusual profits. Maximum efficiency, without the evils of political management and operation, is what is meant by private operation and public participation in financing.

The partnership idea is spreading in the electric railway industry. In some cases, as in Dallas, the community has shown its financial responsibility by au-

thorizing a flexible fare under a service-at-cost plan. Such a plan is now proposed for all of Massachusetts. In other cases, under a more elaborate partnership plan, the community has gone farther and furnished money for new rapid transit construction. A flexible fare and city money are both featured in the Philadelphia lease just adopted. Now the question is pending in another form in Boston, where the Massachusetts Public Service Commission has recommended a public guarantee of the return, public control and a fare increase for rehabilitation, in addition to the present private operation of city-owned rapid transit lines. Between these agreements and between these and older ones, details differ, but the fundamental idea is there—a community of city and railway interest in transportation development.

Progress, however, should be more rapid. The men who originated the partnership idea had vision. If, as Mr. Shonts suggests, we should hope for a similar vision in connection with the steam railroads, how much more should we hope for it in the electric railway industry! The day of rapid construction by private capital has passed, but the day of economic reconstruction with public co-operation is here.

Transportation and the War Construction Plants

A SUDDEN and very heavy demand has been made upon electric railways in several parts of the country for the transportation of workers to and from plants engaged in constructing ships or manufacturing munitions and other war supplies. For many reasons the present is not a very propitious time for railways to extend their facilities, but, worse yet, the traffic which the kind of transportation just mentioned produces is not of a variety which can be handled profitably under ordinary operating conditions.

The time is unfortunate for the electric railways because a succession of untoward events, all too familiar to the readers of this paper, have combined to make it difficult to give good service even to regular patrons. Shortage of men and materials, reasonable and unreasonable demands from labor for higher wages under stress of increased cost of living, automobile and jitney competition, growing street traffic congestion, etc., combined with reluctance on the part of the public to allow increases in rates of fare, have operated to prevent amelioration of the present situation.

As regards the second point, the traffic is not desirable because it is largely of the peak-load variety, which is notoriously expensive to handle. For economic reasons the war plants must be individually very large, thus concentrating the workers in groups of enormous size. Furthermore, they must be located primarily with respect to convenience in securing materials and power, shipping products and protection of equipment from malicious damage. In general, sites meeting these requirements are some distance from present residence centers. Hence, either the workmen must be transported to and from their work or they must be housed near it. In the former case there is a severe tax on the local railway facilities.

Again, the tendency in all manufacturing centers is to follow established custom as to hours of starting or

stopping work. Hence thousands of workers may require transportation at one time and are seriously inconvenienced if they do not get it. But to furnish it requires new track, and more cars, line wire, men, coal—all scarce as hens' teeth these days. Moreover, the service factor of the equipment which would be used to carry such workers to and from their work is low, so that it is used ineffectively; and ineffective use of men, money or material is inexcusable, if it can be avoided, in war time.

By the above we do not mean that the electric railways cannot and will not do their share of the transportation of workers to war plants, but the situation is outlined merely to indicate why this work is not easy or profitable. At many points they are loyally trying to do their part, usually under intense fire of criticism. More and better work in this line can undoubtedly be done even with existing equipment, but co-operation on the part of government, federal and municipal, and contractors will be required.

How the War Workers Can Be Cared For

THE best over-all solution of this special transportation problem will come through the application of the following principles: First, the workers should be housed as near their work as possible, preferably within walking distance. By walking they can save manpower on the cars, reduce the consumption of their own time in transit, and minimize the demand on the track facilities, thus releasing track for freight service. There is some tendency to locate housing centers at a distance from plants to permit the use of large tracts which can be laid out on a grand scale. Such a plan is undesirable from a transportation standpoint and should not be followed unless necessary for healthfulness or some other paramount consideration.

If we assume that housing centers are properly located, next comes an equitable division of transportation duty among railroads, electric railways, waterways and motor buses, particularly the two first named. For the purpose of insuring good freight facilities the war plants are necessarily located on or near steam railroads, and in some cases waterways also. There is thus usually the possibility of furnishing passenger steam railroad service for the workmen, although some slight modification of freight service may be necessary for this purpose. Electric railway service is so attractive and apparently so flexible that government officials are apt to feel that the steam roads should not be asked to discommode themselves as to freight handling in order to run the few trains necessary to get men to and from their work. Economically, however, steam trains should be used for this service when possible, as they utilize track and cars already existing, and also conserve men and materials. Thus, as compared with single-car electric units, a steam train can be operated with possibly 80 or 85 per cent fewer men. That is to say, a steam train of reasonable length can transport a rush-hour crowd of, say, 1500 men economically and with very little use of the track, whereas this would be a tremendous tax on the man-power of an ordinary electric railway.

So much for what the steam roads can and ought to

do. Now for the electric railways. They are primarily in the passenger business and have a much more flexible equipment and organization than the steam roads. They must do their part, and we may assume that a considerable share will be allotted to them, but they need active co-operation. One essential is that the demand upon them should be distributed over as long periods as possible. Different establishments and groups in each establishment can be scheduled to begin and finish work at different times, thus widening and flattening the peak. Second, the electric railways can be helped in financing extensions of track and equipment. In addition there should be a clear understanding on the part of both the munition workers and their employees, of the difficulties which electric railways experience when they try to carry large bodies of men in rush hours. It would be desirable also if riding during rush hours on lines leading to war plants was restricted to actual workers, who could be provided with special tickets to identify them. Permission could also be given for the more efficient use of existing track, such for example as the belt line in Buffalo.

Nothing has been said regarding waterways and motor buses, which have their obvious place when available. The principal point is to realize that there are many factors involved in these special war transportation problems. The electric railways are endeavoring loyally to do their share in solving these problems, but they cannot do it all. The "powers that be," above all must be reasonable in their demands.

Loading at Large Industrial

Points Calls for Special Provisions

METHODS of loading electric cars at large industrial plants constitute as important a problem, in its way, as that of staggered hours. If no plan is followed except that of "first come, first served," the results are most unsatisfactory from every viewpoint, while the dispatching of cars is delayed. The wide interest which attaches to this subject is shown by a number of letters which we have received in regard to an article which we published in our issue of Jan. 12, describing the methods followed at the Ford plant in Detroit.

Here, from 30,000 to 40,000 employees are handled in a period of an hour and a quarter, at one terminal, where a starter dispatches cars at intervals of about thirty seconds. These employees are formed in two lines and enter the cars in turn. The difficulty of keeping the men in line was overcome when the Ford Company discharged some of the most obstreperous. This is the feature of co-operation with the company which makes the scheme most efficient.

With the development of large industries supplying war material in many parts of the country, the conditions at Detroit might be duplicated elsewhere to advantage. It should not be difficult to get employers interested to the extent that they will exercise control over the behavior of their employees while loading at such points. This is but a fair return for special service and is in the interest of the passengers who are to be benefited. Another feature of the system at the Ford plant terminal is the practice of dispatching cars with less than a full load—thus allowing crews to pick up other passengers on the trip. This removes

the criticism that special facilities are given in the interest of a few large employers. The lessons learned at Detroit before the war had caused congestion at many construction centers in this country ought to prove invaluable at the present critical juncture.

Special Freight Service

Merits Equitable Rates

ONE difficulty which all companies meet in making a convincing presentation of a claim for higher freight rates is in determining and proving just what the service costs. Undoubtedly freight business has in many cases been built up as a side line and rates have been made on the basis of the increment in total cost caused by the increment in business. This, however, is fair neither to the passenger business nor to the freight business. The former has to bear the freight "overhead" as well as its own; the latter is not on its own feet, and the apparent profit which it produces may be largely fictitious. The freight business should pay its own way and the charges which are permitted to be made should be sufficient for this purpose.

An essential factor in determining costs and therefore legitimate charges is classification. As far as the transportation company is concerned it matters little what a package contains so long as it occupies a given car space, is roughly of standard form and is not excessive in value. It seems illogical, therefore, to charge different rates for packages in the same car when they are within the range suggested above. This is a point for which the Connecticut Company has contended, and successfully contended, as indicated in the decision recently handed down by the Connecticut Public Utilities Commission.

In its ruling the commission permitted the Connecticut Company to make a single classification for package freight, with suitable excess charges to cover extra risk of damage or extra value. The case has been fully covered from the news standpoint in these columns, but knowing that our readers would appreciate the company's point of view in the matter we have asked V. S. Curtis, secretary and general traffic agent of the Connecticut Company, to state this briefly. The result is an article printed this week. The ruling is attracting considerable interest, as is illustrated by the fact that the New England Electric Freight Association devoted its entire January meeting to discussing it and will continue the discussion at the February meeting.

As evidenced by the ruling referred to the company was not entirely successful in convincing the commission that it is giving a special service for which a considerably increased compensation should be allowed. Undoubtedly such conviction will come to the commission in due course. In the meantime the company is able to handle its business with less clerical routine than if the standard freight classification was required, and some financial relief has been provided also. As in other cases where there has to be a change in its customs, the public must be educated, and the process takes more or less time. Yet, in the end, the fact will stand out clearly that an electric railway can give a certain class of freight service which no other agency can furnish.

Bonus Plan Reduces Coal Consumption at Manila

By Dividing the Saving Effected with Power Plant Employees "Meralco"
Is Able to Increase Wages of Eighty Men More or Less by
About \$700 per Month

By B. H. BLAISDELL

Chief Engineer of Power Plant, Manila (P. I.) Electric Railway & Light Corporation

DURING the early part of the year 1915 the management of this company had under consideration the inauguration of a bonus system of wages for the employees of the power plant, for the purpose of creating in them more enthusiastic interest in fuel saving which would lead to a lower unit cost of electrical energy generated.

A forty-eight-hour economy test of the power plant was made to determine the distribution of the heat losses and the amount available for conversion into electrical energy. The test, with all the accompanying specifications, instructions and data to be obtained, was planned by the J. G. White Management Corporation, the operators of the Manila property.

From a study of the data and results obtained from this test it was evident that considerable saving in fuel was possible without going to any great expense for improved equipment, by securing more careful, intelligent and efficient service from the power-plant employees.

EMPLOYEES TO HAVE ONE-HALF OF SAVINGS

With the exception of most of the engineers all of the employees are Filipinos who have obtained their experience and training almost wholly in this plant. To make these men more progressive and efficient, and less dependent upon the limited supervision of the engineers, it was evident that some special form of monetary reward for meritorious service must be adopted.

A simple increase in the weekly wage was certain to fail in bringing about any great or especially lasting improvement in economy. The reward must be in proportion to the service rendered in the saving of fuel. With this object in view, the management offered the power plant employees, beginning June 1, 1915, one-half of the value of the fuel saved due to effort on their part, the distribution of the bonus to be made monthly to cover such saving as had been accomplished during the preceding month.

Notices were posted explaining carefully every detail of the plan by which it was possible for the employee to earn extra compensation in proportion to his ability to reduce the consumption of coal and decrease the cost of coal to the company.*

The standard of fuel efficiency on which a saving was to be reckoned was set at 41,000 B.t.u. per switchboard kilowatt-hour generated, this being the average efficiency obtained during the forty-eight hour plant test above referred to.

It was only fair and proper that the saving in fuel be computed on a B.t.u. basis, since the company purchases its coal on this basis, all cargoes received being sampled and the heat value determined by an outside and neutral testing laboratory.

With the exception of the engineers, the distribution of the bonus was made to include all the power-plant employees, numbering about eighty, whether or not their duties were directly connected with the consumption of

*Outline of Bonus System, M. E. R. & L. Co., for Power Plant Employees:

1. The standard basis of coal consumption per switchboard kilowatt-hour output shall be 3.50 lb. (Reduced March 1, 1916, to 3.325 lb.; July 1, 1916, to 3.20 lb.; July 1, 1917, to 3.15 lb., and Sept. 1, 1917, to 3.08 lb.)

2. The basis of 3.50 lb. of coal consumed per switchboard kilowatt hour output is based on a standard of 11,715 B.t.u. per pound of coal. This has been fixed on the results of the laboratory analysis made of Fushun coal used during the power plant economy test made March 3 and 4, 1915.

3. The standard basis of coal consumption based on B.t.u. per switchboard kilowatt-hour output shall be determined on the bases of (1) and (2), 41,000. (3.50 x 11,715.) (Reduced March 1, 1916, to 38,952 B.t.u.; July 1, 1916, to 37,488 B.t.u.; July 1, 1917, to 36,900 B.t.u., and Sept. 1, 1917, to 36,000 B.t.u.)

4. The coal consumed per switchboard kilowatt-hour output shall be determined by taking the actual weight of the coal consumed and adding thereto 1 per cent additional to cover possible errors or omissions in weighing, and possible losses of coal consumed in the pile by reason of spontaneous combustion.

5. Fifty per cent of the value of the coal saved on the basis of 3.50 lb. consumed per switchboard kilowatt-hour based on 11,715 B.t.u. per pound of coal, or 41,000 B.t.u. per switchboard kilowatt-hour output, determined by the coal consumed as per Rule No. 4, is to be distributed to certain participating employees of the power plant department as tabulated under Item 6 below.

6. If found practicable or desirable the watch making in a given month a better record than the same watch made during a preceding month, all conditions of operation being taken into consideration, is to receive an additional bonus, to be determined by the chief engineer of the power plant; and the watch making the poorest showing in the same month on the same basis is to be correspondingly penalized.

7. Bulletin boards are to be provided to keep employees posted regarding the basis of the distribution of the bonus and how applied, and the standing of each employee with respect to his participation in the bonus, in so far as it may be practicable or desirable to bulletin such information. If practicable the daily results, as affecting the different watches, should be posted for the information of the employees.

8. The chief engineer of the power plant, who is not to participate in the distribution of the bonus, is to determine the schedule of points to be allowed the different occupations of the different employees of the power plant based on the relative value of their services. He is also to establish a schedule of the penalties to be applied to the schedule of points. (Following is the latest list as modified to July 1, 1916.)

Payroll Classification Item Number	Schedule of Daily points per Employee	Occupation	Payroll Classification Item Number	Schedule of Daily points per Employee	Occupation
1	15	Sub-Foreman	8	2	Boiler cleaner
1	5	Chief coal checker			helpers
1	3	Asst. coal checkers	9	1	Watchman
1	5	Clerk	11	1	Other labor
3	2	Oilers and cleaners	12	10	Mechanic foreman
4	3	Switchboard tenders	12	3	Mechanics
4	2	Switchboard helpers	12	2	Mechanic helpers
5	6	Firemen	12	2	Laborers
6	3	Coal passers	13	1	Construction and reconstruction
7	10	Water tenders			
8	3	Boiler cleaners			
		Total,		79	

9. A record of all penalties imposed is to be made, and the employee affected is to be notified at the time the record is made. Employees are to have the right of an appeal from any penalty imposed, first to the chief engineer of the power plant, next to the assistant general manager.

10. The monthly distribution of the bonus is to be prepared by the power plant department, verified by the accounting department, and completed at the earliest possible date following the last day of each month.

11. The payment of the bonus on a day other than the regular weekly payday will be made at the earliest possible date following the last day of the month in which the bonus applies.

12. The company reserves the right to change the basis of the distribution of the bonus in any way it sees fit, or to discontinue it entirely.

coal or the generation of steam, as an incentive not only to improve the boiler plant efficiency but to keep the electric generating equipment in the best condition for safe and economical operation.

In the plan of bonus system when first bulletined for the information of the employees, emphasis was laid upon the fact that the operation of the plan was contingent upon the continuous, efficient and economic operation of the power plant, with respect to the throwing in or out of the various units, or overloading to their detriment, in so far as the life, the cost and the upkeep

by supplementing the bonus with penalties, the latter to be inflicted on employees breaking the established rules of proper conduct.

The plan as carried out credits each employee with a certain number of bonus points per day according to his position and opportunity to improve plant efficiency. For instance, a water tender receives ten points, a fireman six points, an oiler or coal passer three points, etc., through all the different classifications of employees. Should, however, an employee break a rule or otherwise misbehave, he is immediately disciplined by being



PEG BOARD, 18 IN. IN DIAMETER, USED IN STIMULATING COMPETITION IN FUEL SAVING AMONG POWER PLANT WATCHES

of such units would be affected by wrong practices indulged in for the purpose of saving coal. Under no circumstances would the operation of the bonus system be permitted in any way to affect the reliability and continuity of the electric service which is furnished to the public.

Although all the employees participate in the bonus, the proportion received by each varies with his responsibility or the degree in which his duties offer an opportunity to save fuel.

Profiting by the experience of many companies that have adopted a bonus system of wages only to have it meet with dismal failure in a few months on account of trouble arising of a more or less serious nature solely because no provision had been made to retain discipline, the company provided against such a contingency

penalized according to the magnitude of his offense. Absentees from duty do not receive points.

A daily record of the points received by each employee is posted where he can readily see whether or not he had succeeded in winning all the points he is entitled to for satisfactory service.

The total number of points credited to an employee during the month is a measure of his share of the total bonus earned during the month.

No attempt is made to foster competition between members of a "watch," but rather to encourage co-operation and a willingness to help each other that all may become equally proficient in fuel saving. However, a special inducement is offered to incite a sporting spirit of rivalry among the three watches, each to excel the others in fuel economy, by compelling the members of

the watch making the poorest showing in B.t.u. consumption per kilowatt-hour, as compared with the best previous record of this watch, to forfeit 10 per cent of their bonus points to the members of the watch making the best showing.

The relative standing of the watches in per cent fuel saving covering a period from the beginning of the month to date is shown on a disk hung in a conspicuous place in the employee's dressing room. The information imparted keeps up a perpetual interest and enthusiasm in everyone concerned to do his utmost to make his watch rank first in fuel economy so as to receive an extra share of the bonus as hereafter described.

The disk is about 18 in. in diameter and is painted near its outer edge with four circular stripes of different colors. Black, green and blue stripes each represent the gage of efficiency of one of the watches, while the innermost (red) strips is the average gage of efficiency for the combined watches.

A scale denoting the per cent saving in fuel circumscribes the stripes, the latter being perforated at points corresponding to one-tenth of 1 per cent divisions of the scale. Into the perforations plugs are inserted, two for each stripe.

Round-headed plugs are inserted at points in the stripes opposite the scale readings which correspond with the average per cent savings in fuel obtained from the beginning of the month, while square-headed plugs are inserted at the points in the stripes to show the highest monthly records.

At the end of the month the watch obtaining the highest efficiency as shown by the relative position of its plugs wins 10 per cent of the bonus points of the watch showing the lowest efficiency as denoted by the position of its plugs. The watch obtaining intermediate efficiency receives the regular bonus.

The center of the disk is inscribed with the company's insignia together with appropriate mottoes to encourage economical and reliable service, and an honor roll which indicates by the placing of a star each month opposite the name of the watch boiler-room foreman winning the 10 per cent extra bonus.

It is doubtful whether topnotch economy could be obtained without pitting one watch against the others. Nevertheless herein lies a very great danger to the success and permanency of a bonus system of wages.

DISCIPLINE MUST COUNTERACT OVER-ENTHUSIASM

Enthusiasm runs so high at times that over-zealous men will attempt to accomplish by foul means what they fail to gain by fair means in order to win 10 per cent extra bonus for their watch. They will fight, tamper with the coal scales, slip coal by the checker, overload machinery and otherwise take undue risks in dropping steam pressure and water level or burning fires low just before the relieving watch comes on duty, in order to gain a trifle for themselves at the expense of their opponents and of over-all economy.

To discourage such misdirected effort, prompt and energetic action is taken in penalizing those guilty by depriving them of bonus points commensurate with their offense. The chief engineer of the plant, on receiving complaints from his assistants against men under their charge, imposes the penalties, the men however having the right to appeal to the assistant general manager and from him to the general manager.

This method of discipline has proved very successful in improving the general department and service rendered.

One of the most important matters pertaining to plant operation that demands serious thought and study is securing a proper check on the weighing of coal at the time it is being received and stored on the pile, as well as when the coal is reclaimed from the pile for daily consumption.

The Manila company employs a foreman, a coal checker and a number of assistants, who in conjunction with the coal company's checkers weigh the coal as it is being discharged from the barges. The chief engineer holds these men responsible for any shortage that subsequently may be discovered.

The weighing and registering of the barrows of coal delivered for consumption to the boiler plant is performed by the operating force of coal passers as they wheel the barrows across the coal scales, always, however, under the watchful eye of a regular coal checker.

This double checking of the daily coal consumption by two opposing forces is very important, in fact necessary, for the coal checkers, being responsible for any shortage, watch the operating men closely that they steal no coal in order to increase the apparent fuel efficiency and thereby their bonus.

Further, this method makes it difficult for "Meralco's" and the coal company's checkers to enter into a conspiracy to defraud this company, knowing that the fact will be discovered when the cargo of coal has been used.

That the results obtained in this respect are all that could be desired is affirmed by the fact that not 1 lb. of shortage has occurred in the coal pile since the inauguration of the bonus system two and one-half years ago.

SOME OF THE RESULTS SECURED

An improvement in fuel efficiency began to be realized immediately after the bonus system of reward for fuel saving had been established, and the economies subsequently obtained have been far greater than anticipated.

The firemen, who formerly were mere shovelers, gradually evolved into expert boiler operators, capable of distributing coal at the right time in the right amount and in the right place and to keep an even fuel bed of the proper thickness to give the best results.

In the old method of firing each fireman had certain furnace doors to fire and the resulting efficiency obtained in the different boilers varied according to the ability and interest taken by the individual fireman attending them. The improved method compelled the firemen to follow each other down the line of boilers, at periods depending on the load, firing alternate doors, thus insuring equal furnace operating conditions in all the boilers and higher economy due to the controlling influence of the more experienced firemen in showing up and correcting the faults in firing of the less experienced men.

The water tenders learned to adjust the damper to admit only the necessary air to the furnaces to economically burn the coal required for carrying the load. The frequent use of the Orsat apparatus for testing the flue gases materially assisted in determining the most economical damper opening for different hourly load

conditions. The coal passers, also, became more careful when cleaning fires and ashpits to see that the least possible amount of coal was wasted in the refuse. Finally, the repair men increased both the amount and quality of the work performed, especially in the matter of cleaning boilers.

It became the practice to carry the greatest output possible on the most economical generating units and auxiliaries and to limit the machinery in service to that necessary safely to carry the load.

The actual saving in fuel based on 41,000 B.t.u. per kilowatt-hour, the standard set June 1, 1915, when the bonus system of wages was established, has improved during successive six-month periods as follows:

Second half year 1915.....	5.5 per cent
First half year 1916.....	12.3 per cent
Second half year 1916.....	15.3 per cent
First half year 1917.....	15.2 per cent
Second half year 1917.....	18.5 per cent (estimated)

This remarkable improvement in fuel economy was not wholly due to extra effort on the part of the employees participating in the bonus system, but partly to improvements made in the plant, improved methods of operation and improved condition of equipment, largely due to the valuable engineering advice, instructions and co-operation of the J. G. White Management Corporation, the operators of the Manila property.

It would perhaps be fair to say that the results obtained were due to the efforts of the employees to the extent of approximately 50 per cent of the fuel economy effected, and approximately 50 per cent to the improvements in the plant and its operation for which the company is indebted to the J. G. White Management Corporation.

POWER PLANT IMPROVEMENTS

Some of the changes and improvements made by the company in the power-plant equipment and operation since the bonus system became effective follow:

1. The application of additional heat-insulating material of asbestos and magnesia to the piping, boiler drums and turbine casing.
2. The installation of a combination draft gage on each boiler so located that the boiler attendants can be guided by the indication of the gage as to the condition of the fuel bed and the proper adjustment of the air supply to the furnace.
3. The daily log sheets were improved as to include all data necessary to enable the supervising force to detect defects in operation and effect improvements.
4. The vacuum obtained at the turbine exhaust nozzle was increased by reducing the resistance offered to the exhaust steam entering the condenser. This was accomplished by removing certain condenser tubes so as to open up steam lanes to a large part of the condenser surface.
5. The practice of running extra auxiliary units for no other purpose than to safeguard continuity of service was discontinued without serious consequences.
6. Deflecting arches were installed in all furnaces to effect more complete combustion of the highly volatile coal used.

The economies resulting from the improvements mentioned above necessitated from time to time a reduction in the standard basis of coal consumption on

which bonus for fuel saving was computed, according to provisions formulated in the original plan.

It was only fair to the company to lower the standard basis of fuel consumption at such times as improved efficiency had resulted from changes and improvements over which the men participating in the bonus had no control. At the same time it was necessary not only to take special care in explaining to all concerned the reasons for a change but to select a time for putting the lower standard of fuel consumption in effect when operating conditions were most favorable to economy. At such time there was the least liability materially to lower the amount of bonus to an extent which might cause dissatisfaction or suspicion that the company was not giving the employees a square deal.

Notwithstanding the reductions made in the standard basis of computing the bonus totaling 12.2 per cent, the employees have enjoyed an increasing income therefrom, amounting during 1915 to an average of \$400 per month or 23 per cent of the wages; during 1916 an average of \$600 per month or 35 per cent of the wages, and during 1917 an average of \$675 per month or 39 per cent of the wages. Occasionally the bonus distribution exceeds \$800, but this amount proves rather too generous as the increase in wages derived thereby is greater than the average employees' standard of living requires, resulting in many remaining off duty or requesting vacation leave for a few days, much to the inconvenience of the supervisory force and the resultant efficiency and reliability of the operation of the plant.

CONCLUSION

The bonus system of wages has now been in operation for about two and one-half years with the most gratifying results. The B.t.u. consumption per switch-board kilowatt-hour at the present time is nearly 25 per cent less than it was three years ago. The present saving in fuel cost, based on the latest standard of fuel efficiency put in effect Sept. 1, 1917, is 8.75 per cent. The company and the employees are equal partners, sharing alike the results obtained from fuel saving, a procedure which escapes the criticism that is sure to arise when a company appropriates the lion's share.

The plan of bonus, so successfully carried out without friction between the company and its employees, is due, in good measure, to the freedom it has enjoyed from the agitating influence of labor unions.

While the management, and especially the chief engineer of the power plant, has never wholly approved from a standpoint of principle the offering of a bonus or reward to employees as an incentive to put forth their best effort, the means employed in this plant with this end in view seem well justified, considering the great improvement in economy subsequently obtained and the benefits thereby derived by both the company and its employees.

The Ohio Electric Railway has put into effect a new schedule on all its divisions which provides for alternate limited and local hourly service. Through limited service between Columbus and Indianapolis will be continued. The new arrangement complies with the suggestion of the government for a reduction in the limited service and provides for the present necessity of reducing coal consumption in order to maintain regular operation.

Practical Traffic Relief Offered to Washington

Second Section of Beeler Report Recommends Eight Stops per Mile in the City and Six per Mile in the Suburbs—A Completely Detailed Schedule of Stop Spacings and Locations Is Embodied in the Report

THE second of the unit reports of John A. Beeler on Washington traffic problems was submitted to the Public Utilities Commission of the District of Columbia on Friday, Feb. 7.

In opening the report, the substance of which is given in the following paragraphs, Mr. Beeler pointed out that one of the chief difficulties with the service at present is the low rate of speed. While the cars are geared to run at a maximum speed of 20 m.p.h. or more, the actual rate of progress due to stops and slowdowns is but 8 m.p.h., and in the congested districts even less.

How Stops Affect Schedules.—The number of stops required per mile is for all practical purposes the factor that determines whether or not rapid transit is possible for the community served. A stop consists of three elements, all involving loss of time. The car must be slowed down from its running speed to standstill, it must stand for unloading or loading of passengers or waiting for signals, and finally it must start and again resume its speed.

As an illustration, consider an ordinary Washington street car capable of making 20 m.p.h. without stops. Require it to make eight stops of but five seconds each and the schedule speed is reduced to 10 m.p.h., or only one-half what is possible without stopping. Fourteen stops per mile will reduce the speed to 7 m.p.h.

"Stop at Every Block" Policy.—In an attempt to accommodate their patrons, the electric railways in Washington have for many years operated on the "stop at every block" plan. The result of this policy has been one of the potent factors that have slowed down the schedules, so that to-day the speed of some of the car lines is but little faster than a walk. This conserves neither the time of the patrons nor the finances of the companies, as the slow service is an economic waste for all concerned. The amount of power used, and hence the amount of coal burned in the power plant, is greater where many stops are made. It may be conservatively estimated that $\frac{1}{2}$ lb. of coal is burned for each stop made, over and above what would be needed if the cars ran through.

Irregular Length of Blocks.—The blocks in Washington are marked by the irregularity of their spacing. Some of the original squares are as much as 940 ft. in length, while others are but 260 ft. On Pennsylvania Avenue they vary all the way from 710 ft. to 150 ft. On practically all lines similar conditions exist. Intersections formed by the avenues at acute angles add still more variety to the distances. In addition to the regular streets, the so-called minor streets laid out by property owners between those originally contemplated in the plan of the city add to the irregularity of spacing.

While the average distance between stopping places is extremely short, the actual distances vary so that in certain squares the walk necessary to reach a car stop is much above this average. Few persons complain

about the walk to the nearest corner, regardless of the length of the block. As a result it may at once be inferred that no hardship will be incurred if the spacing is made to conform as nearly as practicable to the length of block which will give the best service to the public, regardless of whether a stop is made at every corner.

Proper Spacing of Stops.—It is not necessary for Washington to adopt any radical skip-stop or other program involving long distances between stops, or a plan that would call for the elimination of one-half of all the stops regardless of the length of the squares. But what is necessary and must be done before reasonably rapid transportation is possible is the equalization of the spacing on a rational basis. This will call for a spacing such that the distance will be sufficient for the cars to make a reasonable run without unduly increasing either the walking time or physical effort to reach the stopping places.

With the above ends in view, a plan for spacing the passenger stopping places on a basis of eight per mile in the city districts and six per mile in the suburbs has been worked out. This plan was presented by Mr. Beeler in elaborate exhibits. This arrangement will change the spacing from an average of about 377 ft. to about 660 ft. in the city. The maximum additional walk involved is equal to but one-half the increased distance, or 141 ft. As this will take less than half a minute at an ordinary walking gait it is readily seen that no serious hardship can result to anyone.

Practically every stopping place in the District of Columbia was examined, and care was taken to locate each stop where it will serve the greatest number, while conforming as nearly as possible to the recommended standard of spacing. In the suburban districts, where the number of persons using the cars is proportionately less, and where the residents are usually located in more or less compact groups, it is believed that the spacing of six stops to the mile will afford better service than a lesser distance. In a few stretches of country territory four stops per mile will be sufficient.

Distinct Signs for Stopping Places Necessary.—The locations for the stopping places must be clearly defined, so as to enable the passengers to be at the exact spot opposite the entrance when the car is brought to a standstill. This will save valuable seconds now lost while the passenger walks all or part of the length of the car. Traffic stanchions, raised platforms, or well-defined lines should mark the loading zones.

Better Time and Less Fuel.—Every schedule in the city will have to be rearranged. By the adoption of these stopping places the running time should be reduced by 15 or 20 per cent. This will cause a corresponding increase in service as soon as the new schedules are put in effect.

A saving of three stops per mile on each of the

Comparative Costs in Boston

Report of Mr. Beeler Shows Why Greater Use Should Be Made of Rapid Transit Operation in Subway and Elevated Facilities

ACCORDING to the report presented by John A. Beeler to the Massachusetts Public Service Commission, as summarized in the *ELECTRIC RAILWAY JOURNAL* of Feb. 9, the cost of subways and tunnels in Boston is so great that they ought to be utilized in the most efficient way, and therefore rapid transit trains should be substituted for surface cars wherever feasible. In supporting this finding Mr. Beeler included in his report some valuable comparative costs which will now be added to the preceding summary. The accompanying tables show for the year ended June 30, 1916, the relative investments, income and trackage, as well as the income and outgo per dollar of business, for the rapid transit lines in Boston, for the surface lines using subways, tunnels and viaducts, and for the street surface lines.

The operating ratio for the rapid transit lines is 54.5 per cent, as compared to 67.1 per cent for the surface system. In Mr. Beeler's opinion the rapid transit costs show the necessity of increasing the revenues on such lines, as it is impossible to make them even self-sustaining so long as it requires more than three-quarters of every dollar received to pay taxes and provide a return on the investment.

The most expensive feature in the entire Boston system, however, is the use for surface car operation of certain rapid transit facilities which are separate from the rapid transit tracks, although operated in conjunction with them. These are the Boylston Street and Tremont Street subways, the Boston tunnel, the East Boston tunnel extension and the Cambridge viaduct. For these lines the investment represents \$15.71 for each \$1 of business, so that the receipts amount to but little more than 6 per cent upon the investment.

(Concluded from page 312)

1,500,000 car-miles operated per month represents approximately a saving of 1000 tons of coal, or 12,000 tons a year.

Suggested Stop Locations.—Mr. Beeler's exhibits in the complete report show the location of all passenger stopping places within the District of Columbia, with the approximate distances between stops. The average number per mile and the average distance between stops are also stated for each section. The present system of near-side stops has been generally adhered to, although numerous exceptions have been made where it is apparent that the far-side stop will serve better.

At junction points and at crossings of electric railway tracks the present stopping places have, in most cases, been retained. However, as schedule speed increases and passenger traffic develops, it may be found necessary or desirable to move some of the present stops out of the traffic throats, as has been recommended at Fifteenth Street and New York Avenue. The stops recommended for these junction points and crossings, therefore, must not be considered as final.

As the numerous stops at the Union Station present a problem different from anything else in the city, they have not been touched upon in this section of Mr. Beeler's report, but will be reported separately.

The investment per mile of track is actually greater than that of the rapid transit system proper by \$57,749.

Moreover, on top of the interest-carrying charges consequent to this tremendous investment, requiring practically 80 cents out of each \$1, a 12½-per cent increase in the operating ratio occurs, owing to the employment of surface methods of operation instead of rapid transit. The former require 67.1 cents out of each \$1, as compared to 54.5 cents on the rapid transit lines. Mr. Beeler believes that there is only one remedy for the situation, and that is to be found in the application of rapid transit operating methods to this portion of the property.

The most remarkable feature of the surface operation, says Mr. Beeler, is the fact that the car-mile earnings were 32.9 cents, in spite of the fact that practically one-half of the 41,400,000 car-miles were performed by the small, antiquated box cars and their open substitutes.

The only efficient type, the center-door stepless trailers, performed less than 5 per cent of the mileage. This, Mr. Beeler notes, largely accounts for the fact that the expense of operation per car-mile was 22.1 cents, resulting in the high operating ratio of 67.1 per cent. The company, however, made a 2.7 per cent

COMPARATIVE COSTS IN BOSTON

	Rapid Transit Lines	Surface Subways, Tunnels and Viaducts	Street Surface Lines
Miles of track.....	36.85	14.88	471.97
Investment per mile of track...	\$1,401,777	\$1,459,526	\$89,806
Revenue per mile of track.....	\$99,559	\$94,030	\$28,896
Investment per \$1 of business..	\$14.08	\$15.71	\$3.10
Receipts per car-mile (cents)...	28.4	32.9	32.9
Operating expense per car-mile (cents).....	15.5	22.1	22.1
Income and outgo per \$1 of business:			
Operating revenue	\$1.000	\$1.000	\$1.000
Operating expense.....	\$0.545	\$0.671	\$0.671
Taxes	0.056	0.056	0.056
Return on investment (5.06 per cent).....	0.714	0.796	0.147
Total outgo, not including depreciation	\$1.315	\$1.523	\$0.874
Deficit	\$0.315	\$0.523	\$0.126
Current depreciation.....	0.094	0.071	0.071
Discarded property account....	0.038	0.028	0.028
Total deficit.....	\$0.447	\$0.621	\$0.027

profit on its surface line operations in 1916. This showed that it would have been better off had it not been necessary to construct rapid transit tunnels, subways, viaducts, etc.

The combined system of the Boston Elevated Railway had an operating ratio of 64.6 per cent, and car-mile earnings of 31.9 cents. The operating expense per car-mile was 20.6 cents. The total investment of \$116,022,060 produced an operating revenue of \$18,686,971, indicating an investment of \$6.21 for each dollar of business. On the basis of \$1 of business, the deficit for the whole company amounted to \$0.121. This figure, as well as the ones preceding, is based on an average return of 5.06 per cent on the capital investment. This was determined by an analysis of the earnings for the last twenty years. At the present time, in order to earn 6 per cent on the Boston Elevated stock, this rate of return on the entire property must be obtained.

The total cost of service for each 5 cents' worth of gross revenue is shown by the following: Rapid transit lines, 7.23 cents; surface cars in subways, tunnels and viaducts, 8.10 cents; surface lines proper, 4.86 cents, and the combined system, 5.60 cents.

Combining Loads to Gain Economies of Large Units and High Diversity Factor—II



FIG. 1—SWITCH YARD OF AMERICAN GAS & ELECTRIC COMPANY, WINDSOR POWER PLANT

THE general layout of the Windsor (W. Va.) power station, and the details of the boiler plant, were covered in the issue of this paper for Feb. 9. The remaining salient features are taken up this week.

The 30,000-kw. General Electric turbo-generator units

are set in a single line through the power house and grouped in pairs with the steam ends of the two units adjacent to each other and directly over the condenser pits located between them. This arrangement brings the ends of the two machines requiring the most attention, as well as the Westinghouse condensing equipments for each pair, adjacent to each other, thus making for convenient operation. Both condensing equipments for the two machines are located in the one pit between and underneath the turbines. These condenser pits were placed 74 ft. deep below the main floor, primarily because the Ohio River at Windsor has a rise of 49.8 ft. from extreme low to extreme high water, and are served by automatic electric elevators.

The basement floor of the turbine room was placed just above high-water mark, and the main floor 18 ft. above this, while the floor of the condenser pit was built low enough so that the cost of pumping circulating water at low river stages would be a minimum.

West Penn Power Company and American Gas & Electric Company Combined Generating Plant—Six Units and 200,000 Kw. Capacity—Water Supply System—Electrical Layout and Control Features—Distribution System of 11,000, 25,000, 66,000 and 130,000 Volts

The condenser pits are 25 ft. 6 in. wide by 91 ft. long.

Each condenser contains 50,000 sq. ft. of cooling surface and is connected to the turbine which it serves by a pipe 13 ft. in diameter. This exhaust connection was liberally designed and was provided with an expansion

joint having a new type of mercury seal placed just above the condenser. The steel cross-members which support the condensers in the pits were placed about 15 ft. above the floor of the condenser well in order to leave space in the bottom of the pit for the air and water pumps. This arrangement of double-condenser pit and wide opening between machines in the turbine room has made it possible to utilize the 110-ton turbine-room crane for handling the condensing apparatus.

On account of the low cost of energy produced by the large units, practically all of the auxiliaries are motor-driven, dependence being placed on the economizers, with which each boiler is equipped, to maintain the heat balance. Two hydraulic air pumps driven by 200-hp. motors and two hot-well pumps driven by 100-hp. motors are supplied for each condenser. The hydraulic air pumps are installed on the platform in the condenser pit which supports the condenser, making a very short and efficient suction connection, while

the hot-well pumps are located on the floor of the condenser pits underneath the condensers. The 50,000-gal.-per-minute motor-driven circulating pumps are located on the floor of the condenser well.

After passing through the condenser, the condensate is pumped through a primary heater in the upper part of the condenser and thence sent up into an open-type feed-water heater which is set on a platform immediately above the feed pumps. These pumps and one service pump are the only steam-driven auxiliaries in the plant. Two of these feed-water pumps are supplied for each unit, one of them being steam-driven and the other motor-driven. One motor-driven and one steam turbine-driven Worthington service pump serving the pair of

condenser-well floor, these pumps discharging directly into the bottom of the water box. For units Nos. 1 and 2, the intake for the circulating pumps is directly from the crib, while the circulating pump intakes for units Nos. 3, 4, 5 and 6 receive water through intake tunnels extended from the crib to the various machines. An extra heavy sluice gate operated by means of a hydraulic cylinder controls the flow of water to each circulating pump.

The discharge of circulating water from the condenser is made at the top and the water is delivered to the discharge well through a cast-iron pipe connecting with a discharge tunnel which lies adjacent to the intake tunnel part way to the river. From this point it

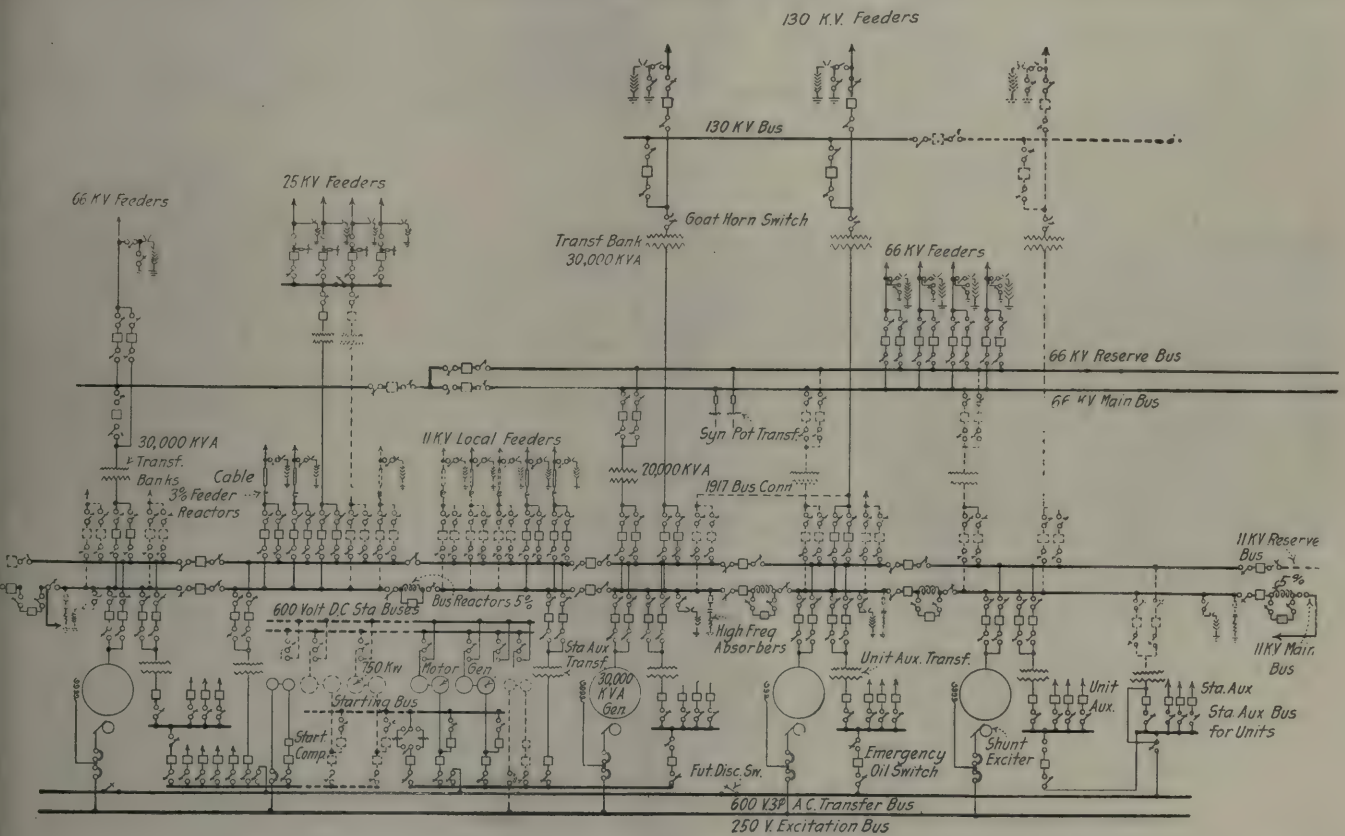


FIG. 2—SINGLE-LINE DIAGRAM OF MAIN STATION CONNECTIONS IN WINDSOR PLANT

turbo-generator sets is installed in each condenser well. These lift the water up into a steel service tank underneath the boiler-room roof, whence all service and make-up water is supplied.

All water drawn from this tank for use in the boilers is run through a settling tank and quartz filter before it flows into the feed-water heaters. This is the only treatment of the water required. Two separate paths for the water between the feed pumps and the boilers are provided in order to take water through the economizers, or deliver water to the boilers direct.

The complete water supply for the entire station is taken from the Ohio River through an intake crib which stands beside the condenser well between units Nos. 1 and 2, inside the turbine room. The water in the crib passes successively through bar iron grills, Chain Belt Company traveling screens and stationary screens to the rear chamber of the crib. From here it is taken through cast-iron pipes to the circulating pumps on the

is brought off at an angle in order to separate the discharge mouth from the intake.

The general arrangement of condenser equipment and intake crib permits the 110-ton turbine-room crane to be used for handling the screens in the crib. This turbine-room crane is equipped with a 15-ton auxiliary hoist which is used for this work. The traveling screens are mounted in a vertical position and so arranged that they can be raised or lowered to meet the conditions as the river rises and falls.

ELECTRICAL LAYOUT OF WINDSOR PLANT

The generators in the Windsor plant are 60-cycle, three-phase, 30,000-kw. units with a generating voltage of 11,000. They are arranged for connection to a double-bus system, made up of a main bus and a reserve bus paralleling it. The former will be operated on the ring system, and while the reserve bus will not be operated as a ring at present, space has been provided to install

the ring connection at a later date if this is thought advisable.

For each generating unit a bus unit is designed and equipped so as to limit the possible interchange of energy between bus sections to an amount well within the guarantee of the oil-switch manufacturer. This is accomplished by inserting a 5 per cent reactor between bus sections. These reactors may be cut in or out of the bus circuit by opening or closing a reactor short-circuiting switch. Whenever the generators are paralleled on the bus they are separated by these current-limiting reactors.

The control of the position of these reactor switches is accomplished automatically. The control circuit which is used for operating the reactor short-circuiting switch, and that for operating the generator switch on the main bus, are electrically interlocked so that if the generator switch is closed the reactor switch is open, and vice versa. This makes it impossible to parallel

Exciting current for each generator is supplied by a 210-kw. exciter mounted on the end of the generator shaft. The rating of each exciter is sufficient to enable it to carry two generators in an emergency, since the power required for the maximum field of one machine is 140 kw. Emergency excitation is further insured by the installation of a 250-volt exciter bus which runs the full length of the station. Arrangements are of course made for connecting all machine exciters and all machine fields to this bus. A 150-kw., 250-volt motor-generator set, which was installed with the first two units, is also connected to this bus to overcome any shortage of exciter capacity. Space in the basement of the switch house has been set aside for the installation of an excitation battery which will be installed later on. A Tirrill regulator has been installed for each exciter and for the motor-generator exciter set.

For supplying energy to the auxiliary equipment, an 1800-kva. three-phase transformer, stepping down the

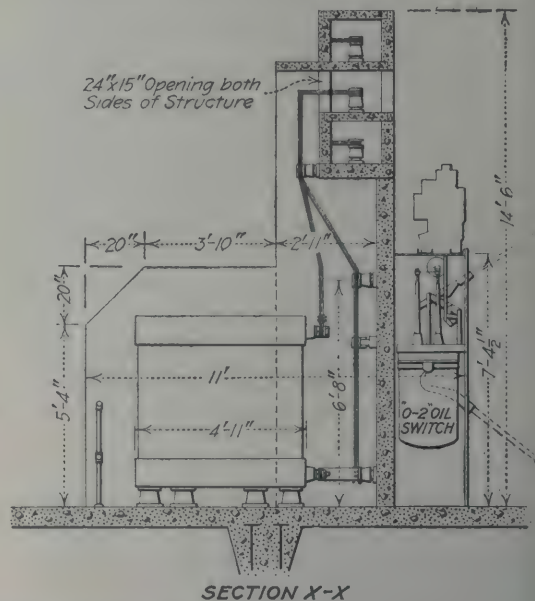
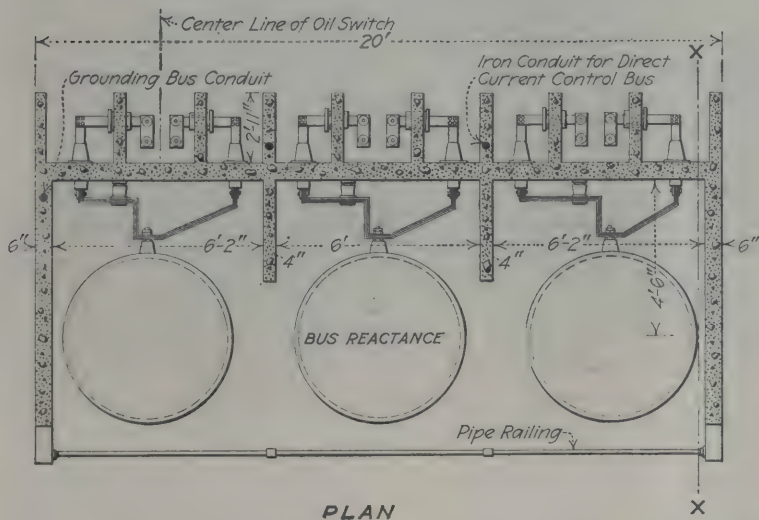


FIG. 3—PLAN AND SECTION OF BUS REACTANCE CONNECTIONS

the generators on the bus without reactors between them, although provision has been made for the independent operation of these switches when this is necessary. This arrangement of current-limiting reactors and switch gears made it possible to keep well within the guarantee of the oil-switch manufacturer, without sacrificing close voltage regulation and without incurring undue expense. In addition to the reactors, a further protection against surges has been provided by the installation of a high-frequency absorber, which is in reality an oil-insulator condenser, having the function of relieving unusual disturbances and strains.

The main 11,000-volt connections between the turbines and buses in the switch house are made through either of two 2000-amp. oil switches. The buses and switch-cell structures, which are of monolithic concrete construction, are placed on the main floor level. The 11,000-volt feeder reactors, potential transformers, lightning arresters, and excitation and control storage batteries are installed in the basement of the switch house, to which access is gained by a stairway at either end or in the middle of the building.

voltage from 11,000 to 550, has been installed for each generating unit. It requires about 1500 kva. to supply the electrical requirements for the auxiliaries serving each unit. This does not include the stoker motors, since they are direct-current machines which are operated on 600-volt current supplied by motor-generator sets which also serve the crane hoists, automatic elevators and coal-handling equipment.

In addition to the transformer installed for each generating unit, two other 1800-kva. auxiliary station transformers are installed for supplying energy to motors about the station not directly connected with any particular unit. These transformers also serve the motor-generator sets which supply energy for the direct-current auxiliaries. All electrical equipment in the power station is of General Electric manufacture.

The control of all electrical equipment within the power house and the supply of 11,000-volt energy to the two individually owned high-tension yards of the two companies are centered in the operating room located between the turbine room and switch house. This room is separated from the turbine room by a glass

partition which permits a view of practically the entire turbine-room floor. In this room are installed a bench-board, a vertical control switchboard, the Tirrill regulators and a log desk for the operators. The turbines, exciters and auxiliary transformers in the station are controlled from the benchboard, which is situated so that the operator is facing the glass partition as he works on the bench. The outgoing feeders are con-

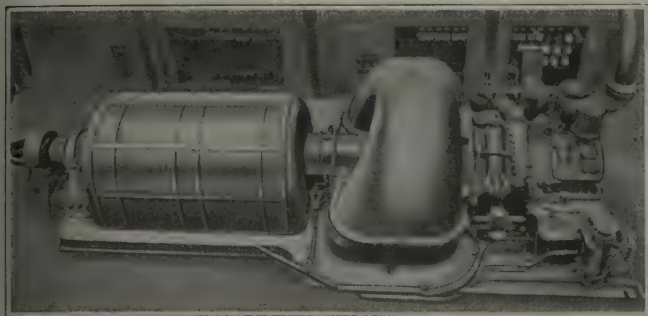


FIG. 4—ONE OF THE 30,000 KW. TURBO-GENERATOR UNITS NOW IN SERVICE

trolled from the vertical switchboard at the opposite side of the room, and the voltage regulators and curve-drawing instruments are mounted on pedestals in the center of the room. At one end of this room, also, is a battery board and behind it a motor-generator battery charging set. At the opposite end of the room is the 600-volt direct-current board. The station watt-hour meter board is located at the same end of the room as the battery board. Stairways at each end of the operating room communicate with the private offices above.

The function of this operating room as the control center of the entire plant was completed by the provision of devices for reading the temperatures of transformers in the high-tension yards, and the temperatures of important parts of the main generators. Alarm bells

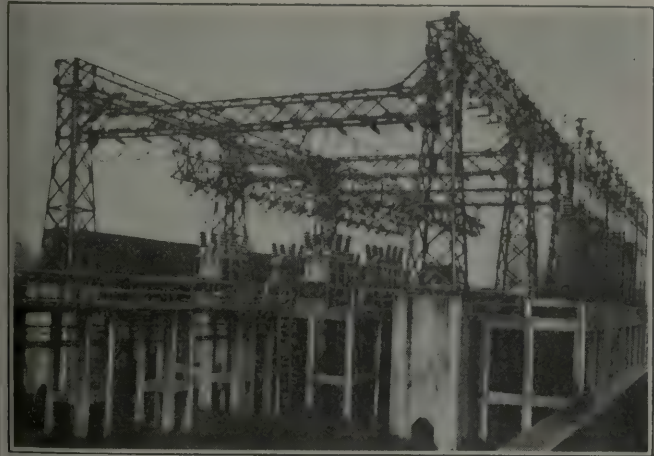


FIG. 5—OUTDOOR SUBSTATION AT WINDSOR PLANT

and signal lamps have also been installed in this room to warn the operators of any interruption in the flow of cooling water to the high-tension transformers.

Energy is carried over the 11,000-volt cables underground from the power house to the two individually owned yards of the West Penn Power Company and the American Gas & Electric Company located at the north end of the power station. Here connection is made to 25,000-volt, 66,000-volt and 130,000-volt transformers for distribution over the several high-tension lines of

the two companies. The local industries use 11,000-volt lines. Part of the West Penn lines operate at 25,000 volts, others at 66,000 volts. The latter will ultimately be operated at 130,000 volts, and the lines of the American Gas & Electric Company are operated at both 66,000 and 130,000 volts. All lines leave the high-tension yards on the radial plan, with arrangements made for parallel operation of two lines in case of emergency. It is understood, however, that radial operation is preferred and that parallel operation is purely an emergency measure. Each of the 11,000-volt feeders for the local industries is equipped with a 3 per cent current-limiting reactor which was selected to limit the current which might flow into a ground or "short" to a value well within the rating of the smallest oil switch in the circuit.

From the main 11,000-volt bus in each yard the energy which is to be transmitted at 130,000 volts leaves the yard from a 30,000-kw. bank of transformers which are tied in solid on the low-tension side. The 11,000-volt switches in the lines supplying these transformers are located inside the power station and meet the requirements of protection and control at the yard



FIG. 6—SOUTH END OF WINDSOR PLANT OPERATING ROOM

as well. In the yard a high-tension transfer bus has been installed, so that in case it is necessary to shut down one bank of transformers the load from any outgoing 130,000-volt line can be distributed over the remaining good transformers. All the 66,000-volt and 130,000-volt transformers are wound so that they may be interchanged and the 66,000-volt units may also be operated later at 130,000 volts. Further flexibility and assurance against interruption has been provided by installing lines for interconnecting the 66,000-volt buses in the yards of the two companies.

In the American Gas & Electric Company yard, a double 66,000-volt bus was installed. At present this is connected to a 20,000-kva. bank of transformers and to all outgoing 66,000-volt lines. In the West Penn yard the 66,000-volt bus is operated normally only as a transfer bus, the energy being supplied by a 30,000-kva. bank of transformers. All outgoing high-tension lines are equipped with induction-type inverse time-limit relays. The transformers are protected by definite time-limit relays. The relays on the 25,000 and 66,000-volt lines are given a minimum setting of two seconds, while those on the 130,000-volt lines are set for three seconds. The transformer relays have a minimum setting of three seconds, and the 11,000-volt feeders have not yet been equipped with the relays. All electrical equipment in the American Gas & Electric Company high-tension yard is of General Electric manufacture, while that installed in the West Penn yard is of Westinghouse make.

The Asininity of Trying to Get Blood Out of a Turnip

The Public Relations Man Who Tries to Camouflage a Reactionary Chief Executive May as Well Try to Get Blood Out of a Turnip, Get Up Steam Without Heat, Lift Himself by His Bootstraps or Attempt Any Other Impossible Stunt

By THOMAS DREIER

SEVERAL years ago the new general manager of what had been a successful manufacturing institution asked me to help him create a new spirit in his organization.

"In the old days," he explained, "this house made so much money, and did it so quickly, that the spirit of service departed. The new owners have never cared either for the public or for their own workers.

"The place is honeycombed with hatred. The present directing head is a snarling sort of person. I am telling all this to you frankly because I want you to know how things are at the start. Our first job is to find out what sort of institution we want here. Our second is to put that spirit of service into the place which will make it regain the position it once held in the estimation of the public."

"We'll have to lie like sixty," the general manager added.

"Lie?" I questioned.

He laughed. "Let us put it this way: Our job is to play a trick on the heads of this business. The folks down the line are pretty good—most of them. They want to do the right thing, and are ready to do the right thing. A few will have to go eventually. Unfortunately, I am not in position to fire the real trouble makers. They are the owners themselves.

"They have a great deal of pride, though. They boast of their integrity and the value of their word. What I want you to help me do is this: We must get out a publication that will go to both the employees here and to the public. I want you to talk with the owners from time to time, and, like a good interviewer, suggest ideas to them which you will write up later, and to which they can attach their names without suspecting that the ideas did not originate with themselves.

"We'll have to get them on record before the public. I am playing the hunch that if we once compel them by suggestion to stand publicly for certain standards of service they will have to back up their promises with performance."

It certainly was an interesting suggestion. The new manager had just come from a distant city to find out why the business was not making the profits it had made years before. He had not been on the job long before he discovered that the trouble was not in the rank and file of employees, but in the executive officers themselves. It would not have helped the work any to tell all he knew to his new employers, so he tried to reform them by suggestion.

* * *

Well, for over a year we worked merrily away. The employees who were right at heart got right into line and helped. Others were gradually eliminated. Conditions improved. But not once did we feel safe. Just when we had patted each other on the back and thought we had put it over the owners would go on a rampage, and cuss some department head in the presence of others. Or some fool order would come shooting down from the inner sanctum which riled everybody up, but which the manager was powerless to help without pouring gasoline on the flames.

It certainly was uphill going. The manager would do something to win back a section of the public that had departed before his arrival, and then, just when right relations were being cemented, along would come one of those fool owners and jam some asinine scheme through which would destroy in a week the work of months.

One night, when the manager and I were dining at the club, he confessed that life was too short for him to spend it trying to perfect a policy and an organization for men who did not know the first principles of harmony and common decency.

"I have wanted to put this thing over as a matter of pride," he explained, "and I have wanted to prove that our suggestion plan is right. But what's the use? When the source of a stream is poisonous you cannot expect pure water until you get a long ways from that source. Running water purifies itself, but sometimes it has to run a dickens of a long way. I am inclined to think that the element

of time will defeat us here. I am not going to break Methuselah's record as a long liver if I stay on this job, and only a Methuselah will have enough years to put it over right. Unless," he concluded, "we go out now and kill those sons of guns."

A short time after he was called to a bigger job, and I wiped one more client off my list of income producers.

That job paid me in two ways. It paid me in what I earned and it paid me more in what I learned.

* * *

When I was asked in New York, a few months ago, what a director of public relations for a street railway should do first of all, I answered without hesitation: "He must choose the right kind of president."

Emerson's famous statement that "An institution is the lengthened shadow of a man" is partially true. An institution is the man who directs it. His spirit is the spirit of his organization.

If you find an organization filled with mean, small-natured, narrow-gaged men, you will find at the head of it a mean, small-natured, narrow-gaged executive.

If, on the other hand, you find an organization where the department heads are personal friends, where those under them are good-natured and neighborly, where there is a spirit of harmony and good-will, you will find somewhere an executive power that expresses harmony and good-will and neighborliness.

All this leads me to say that in public-relations work it is not of first importance to have a weekly or a monthly or newspaper advertising, or any of the other publicity mediums. Street-railway men, for instance, discuss at great length the comparative merits of print paper and coated book, worry the lives of half a dozen printers getting estimates, ink their fingers and their faces in the agony of producing copy, and never once give a thought to the real essential—the spirit of the organization it is their purpose to advertise.

* * *

I yield to no man in my respect for the power of publicity. But much as I want money, there isn't enough money in any publicity job in the country to persuade me to attempt the impossible task of helping to create right relations between the public and a business institution (or any other kind of institution, for that matter) whose dominating spirit is not the spirit of service.

"How can I hear what you *say*," exclaimed Emerson, "when what you *are* keeps thundering in my ears?"

No matter what the skill of the publicity man, no matter what money he is given to invest, no matter how willing his employers are to give him a free hand, all he can do, camouflage as he will, is to advertise the organization as it is.

Some way or other, in ways too mysterious to explain, the truth will work its way into the publicity material—no matter how skillful a liar the writer may think he is.

Private business may get away for a little time longer with executives who have the public-can-go-to-hell spirit, and with executives who have as much regard for the feelings of their associates as a Boche has for the Belgians, but public utilities cannot do it.

The public has an uncanny way of getting a man's real number.

Like a boy in boarding school, he soon finds his rightful place and is forced to take it.

Those fellows in the old stories who used to travel incognito were wise. Think what many an executive would learn about himself that he ought to know for his own good if it were possible for him to change his form and associate on terms of equality with his own department heads.

One does not have to be pessimistic to say that there are some heads of businesses who would emerge from such an adventure with their bump of self-esteem changed into a deep and most depressing dent.

* * *

Therefore, the lesson to be learned from all this is that when you are tempted to indulge in a publicity and public relations campaign you should resist that temptation with all your strength until you are sure that the men who are in charge of the property on which the plan is proposed are right mentally and emotionally.

They may be experts in railroading, they may know all about costs and stocks and bonds and politics and God only knows what else, but if they haven't the spirit that wins and holds the respect and liking of their immediate associates, both above and below them, and if their dominant desire is not a desire to use all their power in giving service, the more nearly their publicity campaign imitates a whisper on a stormy night by the side of an angry sea, the better for everybody concerned.

Have the right spirit in the home office. Breathe it into the outside offices. Make it a part of the daily job for men to be decent and neighborly and helpful. Then you can start your work on the public with some assurance that eventually you will achieve success.

There is no sense sending the infantry over the trenches until you are prepared to support them with all the resources at your command—enough to give them some chance to win through.

There is no sense in printing papers and dodgers and posters, and the like, unless you have an organization placed back of that publicity that will carry out the promises made.

Every bit of publicity should be as sacred as a promissory note to a good business man whose credit is sacred to him.

There you have a practical ideal to work toward.

Rebuilding an Elevated Railway Under Regular Schedule Traffic

More Than \$10,000,000 Has Been Spent on Manhattan Elevated Railway
in Building Twenty-three Miles of Express Track, Involving the
Erection of 50,000 Tons of Steel

THE meeting of the American Society of Civil Engineers, held in New York City on Feb. 6, was devoted to the presentation and discussion of a paper by F. W. Gardiner and S. Johannesson* on "Manhattan Elevated Railway Improvements." The paper was very elaborate and the reading of an abstract by the authors, with the aid of lantern slides, brought out discussion of a reminiscent nature. The following paragraphs cover some of the points in the paper which are of general interest:

The Manhattan Elevated Railway improvements authorized by the Public Service Commission of the First District, State of New York, involved in general the addition of a single continuous express track, with express stations, to the Second, Third and Ninth Avenue Elevated Railway lines operated by the Interborough Rapid Transit Company. The improvements provided for continuous express service during the rush hours downtown in the morning and uptown in the evening.

The work included the building of 23 miles of single track elevated structure, the erection of about 50,000 tons of steel, the building of 638 foundations and the construction or reconstruction of twenty-nine stations, most of the work being in city streets often congested with traffic. The traffic on the elevated railway lines was maintained according to the regular schedule throughout the period of construction.

The reconstruction work involved especially extensive track and structure changes at junction points and terminals.

At Chatham Square the Second and Third Avenue lines intersect. Before the reconstruction the Second Avenue trains continued to South Ferry and the Third Avenue trains to either South Ferry or City Hall. It was desired as a part of the reconstruction work to continue the Second Avenue line to City Hall. The new track layout has eight tracks through Chatham Square, two of which were placed overhead in order to avoid the danger and delays due to grade crossings. The Third Avenue tracks leave City Hall on the lower deck and after passing an island platform divide into three tracks, one being for express trains. The Second Avenue tracks leave City Hall on the upper deck, but later come down to the lower grade and also divide into three tracks. On the South Ferry branch, the Second Avenue line takes the old tracks past Chatham Square, and connects with the Second Avenue tracks from City Hall at the point where the express track begins. The Third Avenue tracks from South Ferry turn out from the old tracks and rising above this grade cross the Second Avenue line and run into the Third Avenue tracks from City Hall between the local and express tracks, later connecting with them.

Another junction of the Second and Third Avenue lines occurs at 129th Street and Second Avenue, where a yard for the two lines is located. From 125th Street to 129th Street on the Third Avenue line there existed, before reconstruction, three tracks, the center one being the uptown main track and one of the others a yard track. It was desired to retain these and add an express track. The new express track rises at 125th Street and continues above the center track to 129th Street to a junction with the upper deck Second Avenue tracks. On Second Avenue the three-track line divides into four at 125th Street, the outside two continuing at the lower deck and connecting with the yard and the local tracks of the Third Avenue line at 129th Street. The two inside tracks rise above the grade of the lower deck and connect with the express track of the Third Avenue line at 129th Street. This four-track line runs across the new Harlem River bridge, with two tracks on the lower deck and two on the upper deck.

There were several other junction points where conditions of this sort had to be met.

STEEL WORK ERECTED IN CONGESTED STREETS

New columns supporting the structure in the street were generally made 15 in. square, built up of two 15-in. channels, with flanges turned in, four angles and a web plate. Columns on the sidewalk, supporting station structure only, were generally built up similar to the track structure columns, but 12 in. square. Generally all columns had to be designed so that they could be erected under the cross-girder with the foundations, including the anchor bolts, in place.

For cross-girders plate girders were in general selected in preference to lattice girders, on account of the simplicity of design and the facility with which a load can be placed at any point on a plate girder without disturbing the uniformity of design. For track stringers plate girders were also usually used, but where it was desired either to keep the construction as open as possible and conform to the existing design lattice stringers were used.

The greater part of the work on the Manhattan Elevated Railway Improvements was in public streets often congested by traffic. Therefore the steel work, the total weight of which was about 50,000 tons, could not be stored in large quantities or for any length of time at the points where it was required for erection. The receiving points for steel in New York were the company's yard at 128th Street and the Harlem River, the dock frontage of which was increased by leasing adjacent property, and a dock front at Perry Street and the North River, which was leased for the purpose.

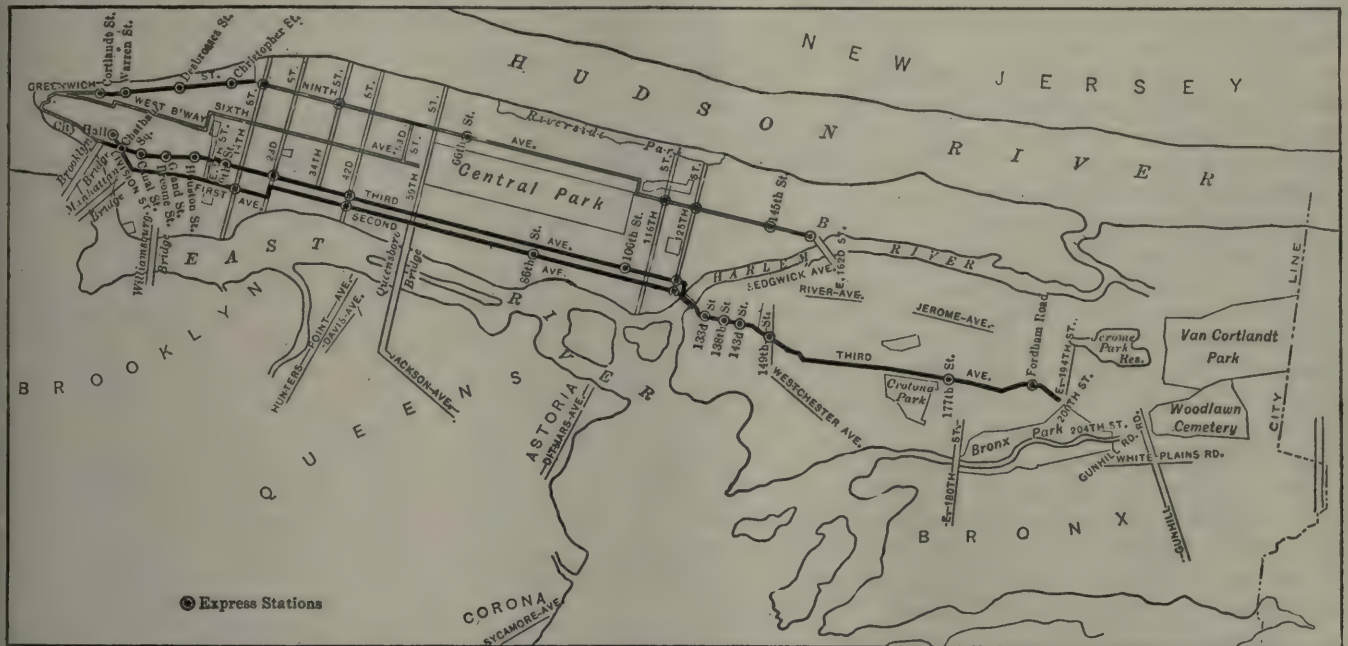
The material yard at 128th Street had an area of about 50,000 sq. ft. and a dock frontage on the Harlem

*For full text of the paper by Messrs. Gardiner and Johannesson see *Proceedings of A. S. C. E.*, December, 1917, page 2042.

River of about 700 ft. The equipment consisted of a derrick with a capacity of 10 tons, used for unloading steel from the lighters and loading on the trucks, and a traveling derrick running on rails on the surface of the yard, used mostly to handle the track timber. A derrick set on the elevated structure adjacent to the yard was used for handling the track material, which was distributed mostly with work trains. All steel work for the uptown sections was delivered at the 128th Street dock and that required by the downtown sections at the Perry Street dock. As material was needed it was lightered from the railroad's yards to the com-

at a new location very frequently necessitated changes of gas and water pipes, duct lines, sewers, and other sub-surface structures, because the locations of the columns were determined by other factors and practically without considering the sub-surface structures even if their positions were known in advance.

The foundations were built of concrete, and were usually rectangular in plan. The top was slightly larger than the base of the column resting on the foundation. The sides tapered downward to the top of a rectangular footing which had vertical sides varying from 1 ft. to 2 ft. in depth and a horizontal offset all around, varying



OUTLINE MAP OF ELEVATED LINES IN NEW YORK CITY—SOLID LINES SHOW SECTIONS IMPROVED

pany's docks, where it was stored temporarily until it could be trucked to the site of the work. Here it was deposited in the street until it could be erected, which generally meant that it remained in the street for only a day or two.

All riveting, drilling, etc., was done by compressed air, three stationary and thirteen portable compressors being used. The stationary compressors were of Ingersoll-Rand make, with Nagel locomotive-type, 100-hp. boilers. The portable compressors were of Chicago Pneumatic Tool Company or Ingersoll-Rand make, the capacity being 300 cu. ft. of free air per min. at a pressure of 90 lb. These were driven by 50-hp. electric motors, taking current from the contact rail of the existing railways. Although in some cases the erection of the steel structure was done with gin poles and jinnywinks, the greater part was done with travelers.

FOUNDATIONS CONSTRUCTED WITHOUT CONSIDERATION OF SUB-SURFACE STRUCTURES

The foundation work involved not only the construction of foundations for new columns at points where no columns existed prior to the reconstruction, but also the rebuilding of the existing foundations where investigation indicated that these were not sufficient to carry the added loading. A total of 638 new column foundations were constructed, 444 of which were at new and 194 at existing locations. The placing of foundations

from 6 in. to 12 in. The bottom area of the foundation depended on the load on it and the carrying capacity of the soil, but was generally not less than 7 ft. square. Usually the size was 9 ft. or 10 ft. square. The standard depth was 15 ft. below the street surface.

The concrete used for the foundation was mixed in the proportion of one part of Portland cement, two and a half parts of sand and five parts of stone, graded to a maximum size of 2 in. On account of the long distance between the different points where the foundations were placed, and the comparatively small quantity of concrete required at each point, the mixing was usually done by hand.

"MEZZANINE" AND "HUMP" STATIONS USED

Wherever conditions permitted one or other of two standard types of express stations was adopted. One type, which required entire rebuilding of the existing station, has two island platforms, between which is the express track, with a local track on the outside of each platform. A mezzanine floor below the track structure connects the island platforms with the stairways to the street.

The second type of construction known as the "hump" station was used where there was not sufficient head room to provide the mezzanine floor. This type involved the raising of the middle express track above the level of the local tracks and the building of platforms to

serve the higher level. A maximum grade of 3 per cent was used for the ascending express track.

The stations remodeled or rebuilt were designed with an understanding of the fact that passengers arriving to take a train generally come singly or in small bodies, while on the other hand passengers discharged from a train are ready to leave a station in a body. The latter condition requires that the exits to the street be as direct as possible, without doors to obstruct passage.

The stations of both the "mezzanine" and "hump" types, as previously described, are provided with toilet rooms, which together with the ticket office are heated. Other rooms are not heated, as in that case it would be necessary to provide doors which would interfere with the progress of passengers. The platform construction consists of platform girders, on top of which are placed I-beams, carrying the wooden floor joists. The platforms are covered with canopies for either part length or full length, according to the traffic conditions and the location of the station buildings.

Throughout the reconstruction work the standard Manhattan Railway track construction was used. The ties are 6 by 8 in. in cross-section, full dimensions, and 8 ft. long. For the outside tracks, where a footwalk is required every third tie is 12 ft. long and carries the footwalk. The spacing of the ties is 18 in. center to center. The track rails weigh 90 lb. per yard, have a 5-in. base and are 5 in. high.

As an example of how the traffic conditions determined the conditions of the work, it may be mentioned that the station at 155th Street and Eighth Avenue serve the Polo Grounds, where the baseball league games are played. The work of reconstructing this station could not commence until the baseball season was over, and had to be completed before the next season started. Another example was the carrying out of the work in Ninth Avenue. There was formerly on the Ninth Avenue line a partial express service as far south as Fourteenth Street. In order to interfere as little as possible with this service, the company desired that the interruption of the express service due to the reconstruction of the stations at Sixty-sixth, Thirty-fourth and Fourteenth Streets and the grade-crossing elimination at Fifty-third Street, should be simultaneous and should not last more than fourteen days. Again when the three spans of the Harlem River Bridge were placed it was ordered that the work should be done in a night between Saturday and Sunday after midnight, at which time the traffic was lightest. As the work depended on the tide the placing had to wait until a Saturday night when the tide was favorable. In fact, throughout the construction the traffic conditions were the determining factors in the progress of the work.

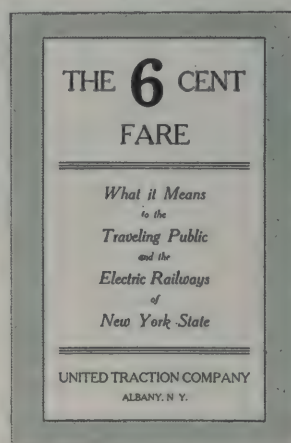
CONTRACTS ON COST PLUS PERCENTAGE BASIS

To advertise for bids, either on a lump sum or unit-price basis, and then accept the lowest bidder would have been a gamble as far as the selection of the contractor was concerned, and the odds would have been in favor of inexperienced contractors. Even if experienced contractors were secured by accepting bids which were not the lowest, the company would not have been free to select when, where and how the work should be carried out to best suit traffic conditions on the existing railway. It was, therefore, finally decided that the only way to get the work done right was to choose contract-

ors who were known by the company to possess the necessary experience to carry on the work, and to pay them the actual cost of the work, plus a fixed percentage of the same, to cover the use of their plant and their services. The soundness of the company's decision is shown by the fact that the work was completed in twenty-three months without undue delays to the train service, and practically without injuring a passenger, although more than 600,000,000 passengers were transported on 2,000,000 trains over the lines under construction. Credit for the wonderful co-operation which existed between the contractors and the railway company is given to the centralization of authority.

The total cost of the work done by the contractors was \$10,273,637.

What the Six-Cent Fare Means



THE 6-cent fare is a subject of vital interest to many electric railways in New York State and to every individual in the territories served. In order to give its public the opportunity for serious and just consideration of this matter, the United Traction Company is distributing to its patrons in Albany and Troy an interesting and instructive pamphlet. The twenty-eight pages of this booklet, the

cover of which is shown herewith, are filled with extracts from commission decisions, newspaper editorials, comments of experts and the like to show how electric railways are confronted with an immediate need for increased revenues.

Coal Consumption on the B. R. T.

The January issue of the *B. R. T. Monthly* was a coal-saving number, with short and practical articles by officers of the company and by C. Loomis Allen, formerly director Electric Railway War Board. Howard Abel, comptroller, gave the following timely and impressive data on coal as an element of cost in local electric railway operation:

In November, 1913, the gross receipts from operation of the B. R. T. system were \$1,950,374, and in November, 1917, \$2,384,035, an increase of 22.23 per cent.

The coal consumed in the former period amounted to 38.119 tons, and in the latter period 48,286 tons, an increase of 26.67 per cent.

The coal cost in November, 1913, was, however, \$82,408, and in November, 1917, \$160,783, an increase of 95.10 per cent.

The quality of the coal in the two periods is reflected in the relative consumption. In November, 1913, it required 3.10 lb. of coal to produce 1 kw.-hr. of electricity, and in 1917 3.32 lb.

To heat street cars by electricity requires about 33 1/3 per cent of all the coal used, so that it can be assumed that the company spends more than \$50,000 per month for heat.

Progress Toward Simpler Classification for Electric Railway Freight

The Author Explains Why the Recent Connecticut Public Utilities Commission Ruling Marks an Advance in the Direction of Simplicity

By V. S. CURTIS

Secretary and General Traffic Agent The Connecticut Company, New Haven, Conn.

THE Connecticut Public Utilities Commission, in the recent ruling which became effective Jan. 1, 1918, established an important fundamental principle which will greatly simplify the conducting of trolley express and freight business in this State. This is the application of express tariff schedules rather than freight tariff schedules for this service. The decision was the outcome of a change in the schedules which was made by the Connecticut Company, effective on May 21, 1917, against which certain shippers protested. While the company considers the actual rates allowed by the commission to be too low, it is gratified by the ratification of the general theory for which it contended.

WHY REVISED TARIFF SCHEDULES WERE NECESSARY

Supplementing the descriptive article on the Connecticut Company's express department, which appeared in the issue of the *ELECTRIC RAILWAY JOURNAL* for Nov. 3, 1917, page 802, it seems desirable to point out some of the reasons why we found it necessary to abandon the use of the official freight classification with its maze of discounts from first-class rates, its cellar of commodity rates and its sub-cellar of "specifics." Let us first review the story of the genesis of this department.

The transportation of merchandise in less than carload lots on electric street railway cars in Connecticut was started at about the same time by Charles M. Cole, of Bridgeport, on the Connecticut Railway & Lighting Company's lines and by George Evans, of Hartford, on the Hartford Street Railway. Both were fairly successful, but their radius of action was too limited for the development of a great business. Both enterprises were absorbed into the Connecticut Company's express department when the consolidation of the principal traction lines in the State was accomplished.

A considerable carload business had been started previously on the Hartford lines in carrying crushed stone from quarries for road building, and sand, which is scarce in that region. This business is still growing, but as none of it requires station service the subject will not now be discussed.

As the Connecticut Company was owned by the New York, New Haven & Hartford Railroad after the consolidation by which it was formed, the steam road naturally selected men from its own freight department to operate the new electric freight service. These men were familiar with the official freight classification and naturally adopted it as their guide. They offered first, second, third and fourth-class rates, and even some commodity rates on less than carload lots, they cheer-

fully furnished station service and some wagon service, and they put all of the "classes" into the same car and gave them all identical service.

In conducting the electric freight business the company, regarding the handling of merchandise as a by-product of the passenger service, did not burden the express department with a strict allocation of its expenses. Favorable statements were accepted as a rule, and everyone came to believe after a while that the express service was extremely profitable. Attempts to analyze costs, particularly relative costs for the various classes, undertaken about a year ago, brought to mind Kipling's remark about the "conformable strata of absolutely impervious inaccuracies."

Analysis soon showed, however, that the handling of less than carload lots of freight through the stations was accompanied by such expense that it was doubtful if a dollar of revenue offset an equal amount of expense. Thus instead of the express department being the "fair-haired favorite" that it had been, it came under the suspicion of having "been in the jam closet." There was real reason for suspecting that the shipper of second, third and fourth-class freight had been getting a dividend in the shape of low rates at the expense of the 5-cent passenger fare.

The remedy proposed for the above condition was to abandon the use of the official freight classification and to substitute a classification based on the official express classification prescribed for the old-line express companies by the Interstate Commerce Commission.

THE CONNECTICUT COMPANY'S TENTATIVE, MAY 21, 1917, SCHEDULE

The first principle of the new classification, like that of the express classification, is that "*first-class rates are applicable to all property received for transportation by this company unless otherwise hereinafter provided.*" Our "provisions" are all for higher than first-class rates if exceptions are noted. The selection of exceptions and the assignment of rates on these was a difficult operation. The official freight classification, with its 400 pages and supplement, took on the aspect and characteristics of Mark Twain's "silent assertion lie"—"the silent assertion that nothing is going on which fair and intelligent men are aware of, and are engaged by their duty to try to stop." Constant attrition, however, smoothed the way, and on May 21, 1917, the new classification was put into effect and the then existing first-class rates were made the standard.

A pamphlet containing the classification was prepared

and distributed. The contents of this are not affected by the commission's action in fixing the first-class.

As soon as the new rates became effective appeal to the Public Utilities Commission was made by wholesale grocers of the State, led by a New Haven firm which had been the recipient of preferential service in the past. Hearings were held in New Haven and in Hartford and numerous data were submitted. As a result the commission decided that the new classification was justified and approved it, but suggested that the rate be made to conform to what had been the second-class rate. It fixed Jan. 1, 1918, as the date upon which the ruling should become effective. In making this conclusion consideration was given by the commission to all factors excepting to the important one of the *value of the service*.

The approval by the commission of the classification has been the source of great satisfaction to those who proposed it and who had diagnosed the previous trouble. One of the results of its operation is that we now have no difficulty in breaking in clerks to receive freight or to way-bill it, while the rest of the clerical work is much lightened and simplified, and its quality is improved. In connection with the putting of the new rates into operation a new receipt or domestic bill of lading, non-negotiable, was prepared. A feature of this is the limitation of value to \$50 or to 50 cents per pound for a single shipment unless a greater value is declared and additional charges for values are paid.

A dictum of the Interstate Commerce Commission repeatedly found in its bulletins reads something like this: "We have consistently held that classification must be based upon a real distinction from a transportation standpoint. A classification cannot be regarded as scientific, or a difference in rates as well based, which is altogether founded upon a distinction that has no transportation significance. Such a differentiation would lead to an almost endless multiplication of rates, which would find no excuse save the use which might be made of the articles transported." (Stowe-Fuller Co. vs. Pennsylvania Co., 12 I. C. C. 215).

It is true that this dictum has usually been cited in an order reducing some rate, but as a ladder would lose half its value if it were good only to climb down on, so this statement should have equal force in connection with a rate increase. At any rate, somebody ought to be able to climb up on such a ladder.

Manufacturer Takes Share of Railway Load Peak

The Westinghouse Electric & Manufacturing Company has been co-operating with the Pittsburgh Railways in the supplying of power during the rush hours on lines furnishing railway service to the manufacturing company's plants. A rotary converter installed at East Pittsburgh is used to furnish power at 500, 550, 600 or 650 volts according to line conditions and the power needs of the railway. Between 600 and 700 kw. is supplied for an hour or more in the morning, from 6.30 to 7.30 o'clock, and from about 4.45 to 7 p. m. With both companies the main consideration in making the arrangement was the improved facility for getting the employees to and from their work promptly.

Zone System Impracticable in Boston

President Brush Elaborates Testimony Given Before Public Service Commission at Hartford Hearing

IN THE REPORT of the testimony of M. C. Brush, President Boston Elevated Railway, at the Hartford 6-cent fare hearing last month, published on page 229 of the issue of this paper for Feb. 2, Mr. Brush was quoted as saying that zone fare collection was impossible on an elevated line. In answer to an inquiry addressed to him by this paper asking if he was correctly quoted, Mr. Brush explains that his statement related to the Boston Elevated System. He then gives the following interesting facts in regard to the fare system in Boston:

"The situation with respect to the application of a zone system to the Boston Elevated Railway system is simply this:

"We are the only property, so far as I know, in the world that operates street cars underground, on the surface and overhead, and operates trains underground, on the surface and overhead, covering an area of 80 sq. miles, twelve cities and towns, with universal transfers between, all six kinds of surface transfer taking place in a very large number of cases in our so-called prepayment areas or within inclosed areas, making the use of paper unnecessary.

"In addition to all such prepayment area transfers, we receive in lieu of fare somewhat more than 85,000,000 paper transfers a year. The fact that a person can ride part of his journey on rapid transit and part on surface lines, and that there is but one fare on the entire system, would make it impossible for the company to establish a zone system which would be equitable both for rapid transit and surface lines. In other words, that zone system which would be proper and fair for rapid transit lines would be wrong for surface lines and vice versa.

"It is perfectly feasible to operate a rapid transit line on a zone principle because all that is necessary is to have passengers buy tickets at any station for any other particular station and upon reaching their destination surrender the proper ticket for that station, and failing to do that pay an additional fare. But where passengers can ride part of the way on rapid transit lines, then go into an inclosed area and get on a surface car and ride either the remainder of the journey or a portion of their journey and again get on a rapid transit line, I personally know of no way by which a zone system can be arranged which would be fair. This is entirely aside from the question as to the impracticability or impossibility of collecting fares under such circumstances.

"The only way I know that a zone system can be applied to the Boston system would be to have the termini of all rapid transit lines included in the central zone. But with a terminal, such as Forest Hills, lying approximately 5 miles from the center of the city, such a large central zone would be created by this plan that the amount of riding outside of this zone at an additional fare would be comparatively small. In consequence, the additional receipts gained by the zone system would not count greatly in the problem which the Boston Elevated Railway is facing to-day."

Color Scheme to Simplify Transfer Issuing

The New York State Railways, Rochester lines, are using a plan for issuing transfers, involving the use of five colors, which does not require the printing of the date on the transfers. On each transfer a day of the week is printed in red, so that for each day of the week there are transfers of five colors available. The transfers are ordered out one day in advance of use, the color being selected but not announced in advance by

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JOSEPH		TIME	
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TRANSFER POINT		P.M.	
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MAR		3 30	
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Government Must Help Utilities

Needs of Public Service Corporations Set Forth in Hearing on War Finance Bill Held by Senate Committee on Finance

REPRESENTATIVES of the public utility companies of the United States have had two opportunities in Washington within the past week to present the problems of the utility companies to Government legislators and officials, and are much encouraged with the reception of their views. On Jan. 8 a presentation of these problems was made to the capital issues advisory committee of the Federal Reserve Board, with Governor Delano and Governor Hamlin present, and Allen B. Forbes, chairman, presiding, and on Feb. 12 representatives of the utility companies appeared before the Senate committee on finance to discuss the proposed war finance corporation bill.

The argument before the capital issues advisory committee was presented by P. H. Gadsden, president Charleston (S. C.) Consolidated Railway & Lighting Company, a member of the War Board of the American Electric Railway Association, at the request of John J. Stanley, president of the association. Mr. Forbes, the chairman of the advisory committee, had requested the heads of all the big utility organizations to be present, and, in addition to Mr. Gadsden, among those present were the following: John W. Lieb of the New York Edison Company, president of the National Electric Light Association; Alfred Forestall, president of the American Gas Institute; E. K. Hall, Electric Bond and Share Company, New York; H. H. Crowell, vice-president Michigan Railway, and representing the Hodenpyl-Hardy interests in Michigan; C. M. Clark of E. W. Clark Company, Philadelphia; and H. G. Bradlee of Stone & Webster, Boston.

At the hearing before the Senate finance committee statements were made by S. R. Bertron of Bertron, Griscom & Company, New York; H. H. Crowell and Mr.

(Concluded from page 325)

Subway Commission. He said there would be time enough to talk about enabling legislation and rate of return after an agreement has been reached on a physical program which will meet with popular support. He referred to the commission report as being fundamentally sound, but said there were certain modifications which appeared to the companies as having merit from an operating point of view.

Mr. Busby said he did not believe in painting pictures as to what might be had in the distant future in the way of subway development, and he thought if the purpose could be served at an earlier date by an extension of elevated lines, this should be done. His statement was well received by certain of the aldermen, who had opposed the commission report for holding out no relief in the near future for their districts in outlying parts of the city.

Mr. Busby said that rapid transit development in Chicago had been at a standstill for many years. It is now only 14 per cent of the total mileage, whereas New York will soon have from 40 to 45 per cent rapid transit service. Chicago's development depends upon the extension of rapid transit service, and the only limitation to be kept in mind is that which would insure such a system to be self-supporting.

Gadsden. The argument, which was substantially the same at both hearings, was, in effect, as follows:

First: Public utility rates must be increased, as labor and materials are eating up equities in these properties. The fundamental remedy is to restore values by increase in rates.

Second: During the war the companies should be relieved of franchise requirements, such as paving streets and placing wires underground. Such work should be regarded as unnecessary capital investment at this time.

Third: The companies are being called upon to make large expenditures for extensions and betterments to meet the needs of government plants for power, transportation, and other parts of the war program. It is estimated that these expenditures for the year will be between \$100,000,000 and \$200,000,000, required for Government purposes. Some way must be provided for the Government to furnish this money.

Fourth: The public utilities, railway, gas and electric companies, have maturing obligations in 1918 of about \$225,000,000. Under present conditions, where the Government has monopolized the whole money market, it is impossible to finance these maturities through the banks, and if the companies are to continue to perform their essential part in furnishing facilities for the speeding up of industry in this country, the Government must furnish the public utilities some relief in taking care of the maturing obligations.

It is understood that the Senate committee on finance was evidently seriously impressed by the situation which confronts the companies, as explained by the witnesses. Members of the committee frankly asked the gentlemen before them if it is not possible for Congress to grant some relief. It is felt that the committee practically unanimously felt the force of the rate question, as well as sympathized with the suggestion that the companies be relieved from non-essential expenditures; also there was apparently no question but that the committee realizes that much new capital will be required by the companies in order to meet the Government's war needs. The committee, by its questions, indicated an apparent unwillingness to grant such unlimited powers as those conferred in section D of the proposed war finance corporation bill. Mr. Gadsden took the position before the committee that public utility securities are a class which must be taken care of, and suggested to the committee that the words "Public Utilities" be inserted in this section of the bill, to leave no doubt that it was the intention to provide for them. A hearing at which representatives of the public utilities will be present will soon be held on this bill before the House committee on ways and means.

The Public Service Commission for the First District of New York has authorized the Public Service Commission Association to look after the commission's employees, now numbering 218, engaged in military or naval service. It is proposed to provide a Christmas box for each of the men, to furnish comfort kits and such other necessities as may be required, to aid the families of the men in such emergencies as may arise during their absence and to meet such other conditions as may arise from time to time. In order to carry on this work each employee will be assessed from 25 cents per month to \$1.50 per month.

CONSTRUCTION, MAINTENANCE AND EQUIPMENT

ENGINEERS, MASTER MECHANICS AND OTHERS WHO HAVE DEVELOPED ECONOMICAL PRACTICES, OR WHO HAVE WORTH-WHILE IDEAS ARE INVITED TO TELL READERS OF THE JOURNAL ABOUT THEM IN THIS DEPARTMENT



FLEET OF AUTO BUSES IN FRONT OF SAN FRANCISCO MUNICIPAL CAR HOUSES

First Special Monthly Mechanical and Engineering Number Appears Next Week

THIS will be the last issue for the present in which the short technical articles will be grouped in a separate "Construction, Maintenance and Equipment" department. These articles, which have proved so useful to the readers of the paper, will continue to be printed, but either segregated in the third issue of the paper for each month or scattered among the longer articles in the weekly issues.

Appreciating an urgent demand for practical articles dealing more comprehensively with the elements of the mechanical and engineering aspects of electric railroading, the editors of this paper have arranged definitely to meet this demand. The co-operation of a group of qualified writers has been secured and a large section in the Feb. 23 issue will be devoted to the first group of special articles which they have prepared. In these articles the authors give facts and figures which will help the ambitious youngster to rise faster, and they will contain much by way of suggestion for more experienced men.

The editors desire to emphasize, however, that while the special writers will supply a considerable number of articles there will always be space available for worth-while contributions from the many occasional contributors who have done so much to help the JOURNAL in serving its clientèle.

Municipal Auto Bus Traffic Feeders at San Francisco

BY N. A. ECKART

Railway Engineer Board of Public Works

THE Municipal Railway of San Francisco, on Jan. 15, 1918, put in service a bus system to serve as a feeder to its Geary Street car line and to render service to the residential section known as the Sunset District. Transfers are exchanged between the buses and the cars for the usual 5-cent fare. For the present the buses operate over two routes, 1 and 2 miles in length respectively, each crossing Golden Gate Park. On both lines the route is paved except for the half mile of oiled macadam across Golden Gate Park. Two buses maintain a ten-minute headway on the 2-mile line, and a single bus runs on a fifteen-minute schedule on the other. The average speed is 12 m.p.h. Thus the fleet of five buses which the city has purchased serves the two routes and allows two buses to remain in reserve.

The buses, which are arranged to seat eighteen passengers, and will carry as many more standing, are of the prepayment type, designed for one-man operation. They are mounted on White 2-ton chassis, and are equipped with 37-in. x 5-in. pneumatic tires, single on the front wheels and double on the rear. They are 15 ft. long, 7 ft. wide, and have a wheelbase of 13 ft. 8 in. The weight, light, is 7830 lb. The buses are fully inclosed with drop sash and are finished inside and out in harmony with the standard practice of the municipal railway cars.

amount of discard in any case, and to provide that the customer's inspector shall have the right to say whether or not this minimum shall be exceeded and to what extent. In some cases the minimum is made as high as 30 per cent. Demands of the inspector which the manufacturer considers unreasonable can be made a matter of individual settlement.

After discard comes the question of the processes of forging of which there are three in general use, namely, rolling, hammering and pressing. It is generally felt that rolling (except as a preliminary process) does not give a thorough working of the metal. With the other two processes the user should satisfy himself that the hammer or press equipment of the manufacturer is of such weight or power as will give thorough penetration. Good evidence of thorough working will be found in the ends of the axle, which if well worked will have more or less of an egg shape. On the other hand, if there has been only "skin forging" the ends will be concave.

With regard to the consumer's requirements as to the details of the chemical composition of the steel, different opinions have prevailed, but it seems fair that the manufacturer should make his own mixture in accordance with his best judgment as to what will give the character of steel which the purchaser desires. That is to say, if a carbon steel of certain physical qualities is desired the manufacturer should be permitted to state what proportions of carbon, manganese and silicon there shall be. On the other hand, the user has a right to ask for certain limits for impurities, such as phosphorus, and for the privilege of making check analyses of the full chemistry to see how uniformly the desired chemical composition is being maintained. If he considers it necessary he may also provide that drillings taken from the completed axle shall not exceed a given maximum of impurities, and also not exceed a given variation in carbon content between the center and the outside to provide against undue segregation. It must not be forgotten, however, that to some extent these are niceties which are not justified in every service, and necessarily increase the cost of the axles.

HEAT TREATMENT

Next in order comes the so-called "heat treatment," a much-abused word which has been used to cover a variety of heating processes after the final forging. This treatment, in the minds of some, has been thought in some mysterious way to provide an axle which is free from all troubles regardless of its design, chemistry and handling in the process of manufacture. When it is understood, however, that heat treatment is applied simply to obtain a more closely-grained structure, and in some cases to increase the tensile and ductile properties, it will be recognized that heat treatment merely adds one more step in the production of a high-quality axle. It in no way lessens the necessity for careful attention to the previous steps mentioned.

Until some ten years ago the usual method of handling high-class axles after forging was to bury them in hot ashes and allow them to cool slowly. This operation, when carefully performed, often produced very good axles. As demands of service became more exacting other methods were resorted to for producing a stronger and more uniform product. This led to the use of alloy steels and finally to "heat treated" or, more

properly, quenched-and-tempered material, the quenching medium varying with the ideas and methods of the manufacturer.

While all the steps in the axle manufacture are important and require great care, that of heat treatment, affecting as it does the very molecular structure of the material itself, is most susceptible to improper handling. In consequence, attempts to get results by inexperienced operators have failed and have led in some quarters to condemnation of all heat treatment. But it is generally recognized that some form of heat treatment tends to produce a closer grained and more uniform material, some preferring simple annealing, and others quenching and tempering.

It is not the purpose of this paper to set forth any one set of physical qualities as being more desirable than another, and no opinion can therefore be expressed as to the relative merits of simple annealing, or quenching and tempering. Suffice it to say that it is generally agreed that after forging the axle should be reheated in a furnace under carefully regulated conditions to reduce any inherent strain and to refine the grain of the material.

The details of the type of furnace used, quenching medium, etc., while important, are nevertheless, as recently pointed out in an editorial in this paper, subservient to the honesty, integrity, ability and experience of the operators and to the care with which the results obtained are checked, either by the producer or the consumer.

TESTING AXLES FOR CONFORMITY WITH SPECIFICATIONS

The point last mentioned above brings us to the consideration of the number and character of the tests which should be made by the user to satisfy himself that the product is satisfactory. The M. C. B. committee of 1896, before referred to, reported as follows in regard to the specification it was presenting at that time: "For steel axles the specifications submitted will insure, within a reasonable probability, that the lot from which one is taken is fairly represented by the one axle tested." It will be noted that this specification merely required the drop-testing of one axle from each open-hearth melt, which might include 100 or more axles.

It need hardly be stated that the optimism of the committee has not been entirely justified by experience. More recent specifications, such as the standard specifications of the American Society for Testing Materials, require that each axle be made with a prolongation at one end and that one axle be selected for test from each annealing charge. This usually means that one of each twenty or thirty axles is tested for tensile properties and has check analyses made of chemical impurities. This, of course, represents a marked advance over the old M. C. B. method of merely drop-testing one axle from each open-hearth melt. But it is questionable whether even this represents all the care that should be taken for such an important part as a passenger-car axle used in severe service.

Experience shows that, even where the best of material has been used, occasional failures will occur. To eliminate these occasional failures, which while not representative of the rest of the axles may prove troublesome, it may be justified in some cases to subject each axle to test. While this, of course, adds to the initial

cost of the axle, it is warranted by the character of the service. It may even pay to make the axles with a prolongation at each end, and to take tension and cross-bending pieces and drillings for analysis from both ends. Carbon determinations may also be taken at the center of the axle and at the periphery, and the carbon content may be required to vary not over a given per cent. Where desirable, occasional microphotographs may be taken to show the closeness of the granular structure. By so doing, the user has satisfied himself as nearly as may be that the axles are uniform in quality, and it cannot be too strongly emphasized that uniformity is the most necessary quality.

Axles made to the old M. C. B. specification, if uniformly of the same quality, would undoubtedly be satisfactory for many services. All of the improvements in manufacture have their best result in the production of a more uniform structure, and it would therefore seem that the user is justified in taking precautions to ascertain that this uniformity has been obtained.

A last and very important check on the soundness of the axles is the subjecting of each to a proof test by dropping thereon a weight from such a height as not to strain the steel above its elastic limit. This matter has received attention from the American Society for Testing Materials, the latest *Proceedings* making reference to the desirability of some such test and quoting two different standards. It is not as yet determined which of these is the more desirable. Experiments including some recently made indicate that neither of them is entirely proper. It is probable that this matter will receive further attention in the near future.

CARE OF THE AXLE IN SERVICE

The general procedure in purchasing axles is for the user to receive the axles from the manufacturers in the rough-turned state and to finish-turn them in the railway shops. In turning care should be exercised that the true radius of the fillets is maintained, as a sharp corner or tool mark made by a careless workman may defeat all the care used on the design and preparation of the axle.

Even with the best of care a poor axle may slip by, and it is therefore necessary to have some means of inspection of the axles in service to be sure that they have not cracked. Before considering inspection methods it may be well to review the nature of the common failures.

CHARACTER OF FAILURE

Where poor metal has been provided, or the design is abnormally weak, instances are found of a "clean break," but by far the most troublesome difficulty is the gradual or so-called "detail" fracture, which starts with a small very fine crack and gradually progresses through the axle. The appearance of the broken axle is in general of two different aspects, one wherein the failure runs around the periphery of the axle and gradually works around the center more or less concentrically, and the other wherein a succession of crescent-like sections are found, each enlarging as the center is approached. These failures are characteristic and when once recognized are always readily distinguishable from a clean break. These detail fractures when they have progressed but

New Portable Pipe Vise Which Employs Chaingrip Feature

THE "Chaingrip" pipe vise is a simple portable vise which can be quickly moved from one location to another and fastened to any horizontal or vertical support without the use of bolts. It locks pipe or conduit of any size within its limit by the slight push of a lever. The base support is in the form of an inverted V, and the vise is held in position by a heavy wrought-iron chain. This chain, passing around the supporting



PORTABLE VISE ADAPTED FOR USE ON ANY SUPPORT

column, catches in a socket, the tension being adjusted by a nut on an eyebolt, as shown in the accompanying figure.

The locking motion of the pipe between the steel jaws and the close-link chain is accomplished by the movement of the handle toward the vise. Beneath the fulcrum point the handle has the shape of a cam, and operates against a movable horizontal bar to the end of which is riveted the steel gripping chain. The fulcrum point of the bar is supported by a threaded bolt, rotation of which raises or lowers the fulcrum point and provides an adjustment of pressure on the gripping chain. The "Chaingrip" pipe vise is manufactured by the Gerolo Manufacturing Company, Chicago, Ill.

part way are very difficult to locate, the crack being so fine that it cannot be discerned even with a glass. A good method for periodical inspection for cracks is to immerse the axle (with the wheels mounted) in a tank of hot oil, and then to wipe the oil carefully off and cover the axle with whiting. The axle is then rested on a block at its center, with the wheels hanging free, and is struck several blows with a heavy sledge. Wherever there is a crack a fine thread of oil works up from the crack under the vibration set up by the sledge blows and is readily seen against the whiting. A careful record, signed personally by the inspector, should be kept of each inspection.

CONCLUSION

As has been before stated, the writer does not claim that all of the safeguards mentioned herein are necessary to be followed in all cases, but he has simply outlined them so that they may be readily available to axle users in general. To the discretion of the individual must be left the determination as to whether his service conditions demand the insurance provided by these means, or whether there are still further means that he can take to satisfy himself of the quality and condition of the axles.



NEW INTERURBAN CAR FOR MONTREAL & SOUTHERN COUNTIES RAILWAY

Light Interurban Car for Montreal & Southern Counties Railway

Cars Have Spring Buffers, Center Sills Continuous From Bumper to Bumper and All-Steel Underframes of Through Platform Type

BY J. A. WILSON

Superintendent Car Department Ottawa (Canada) Car Manufacturing Company, Ltd.

THE Montreal & Southern Counties Railway, Montreal, Canada, has recently received from the Ottawa Car Manufacturing Company, Ltd., two of three motor cars for interurban service. As these cars operate over the Victoria Bridge they were built as light as possible consistent with strength, the weight completely equipped being 61,000 lb.

The car is built on a special lightweight all-steel underframe of through platform type, the side sills being of 5-in. Z-bar, weighing 11.6 lb. per foot, and the center sills of 10-in. channel weighing 20 lb. per foot, continuous from bumper to bumper. Knees and bumpers are of 6-in. channel with headstocks built up of plates and angles. The bolsters are built up of pressed steel sections, plates and steel castings, and the body is strengthened with both top and bottom truss rods. An anti-climber spring buffer, as described in the issue of the ELECTRIC RAILWAY JOURNAL for Nov. 10, 1917, page 867, is installed at each end of the car to take up slight collisions, being guided by channels supported by the center sills.

The body is of wood, well braced, finished on the inside in Mexican mahogany, the outside being painted in Pullman green, the lettering being in gold.

The bodies are mounted on Taylor trucks with Davis steel wheels, the motor equipment consisting of four Westinghouse-306 motors. The air brakes are of Westinghouse type AMM with supplementary reservoirs and governor synchronizing systems arranged for trolley circuits. Other features are the Westinghouse HL control and electropneumatic signal system, pneumatic sanders, luminous arc headlights, strong locomotive-type pilots, steel snow scrapers, Tomlinson automatic car and air couplers, etc.

Attention is directed also to the trap door hinged to the bottom of the vestibule door to cover the step well, and held up with a spring latch when the door is open. (See ELECTRIC RAILWAY JOURNAL, Nov. 17, 1917, page 910.) All vestibule doors are equipped with the Ottawa Car Manufacturing Company, Ltd., holdbacks. The seats are Montreal & Southern Counties' standard reversible type, upholstered in green Pegamoid and the headlining is of Agasote painted green.

Motor-Generator Set for Interurban Car Lighting

A NEW type of motor-generator set has been put on the market by the General Electric Company for the purpose of providing a system of car lighting which will be independent of trolley voltage. It consists of a motor which is driven from the trolley circuit and a compensating generator which produces about 32 volts

at any speed at which the motor is likely to operate even under unusual conditions.

The principle upon which the generator operates is shown in the accompanying diagram. The generator armature is series wound, and the field contains twice as many poles as the number of poles for which the armature is wound. In the diagram but four

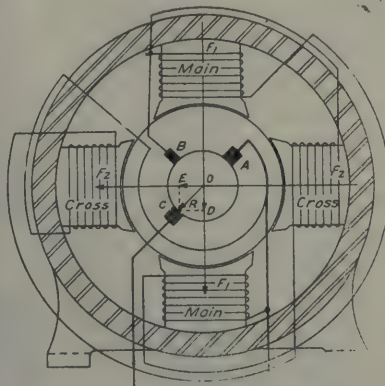


DIAGRAM OF GENERATOR FOR PRODUCING CONSTANT VOLTAGE WITH VARYING SPEEDS

poles are shown. The lighting circuit is taken from the brushes A and C, and in addition to these load brushes there is a third brush B placed 90 electrical degrees from the load brushes. From the diagram it is apparent that the electromotive force between A and C is the algebraic sum of two electromotive forces produced by the

pairs of poles which are marked "main" and "cross" respectively. The way in which it is possible to have a practically constant electromotive force between *A* and *C* is explained as follows:

The field may be considered to consist of two independent magnetic circuits. One of these, F_1 , is saturated, and the corresponding flux may be called the main flux of the machine. The second magnetic circuit, F_2 , is not saturated and the corresponding flux may be called the cross flux. The main flux generates, between brushes *A* and *B*, an electromotive force which can appropriately be termed the main voltage of the machine, while the cross flux generates what may be termed the cross voltage. The excitation, which is taken from brushes *A* and *B*, consists of two branches, one exciting the main poles, the other the cross poles.

Since the main circuit is saturated the main flux remains constant, and the main voltage *AB* is proportional to the speed. Therefore, the excitation of both the main and the cross fields is proportional to the speed. As the cross circuit is not saturated the cross flux will increase in proportion to the speed, and hence the cross voltage *BC* must increase with the square of the speed. As the speed increases *AB* increases, but since *BC* increases faster the difference is constant. Test shows that it can be made constant over a wide speed range.

Of course, in a machine of this type it is necessary to provide for armature reaction. Since the line current is taken from the brushes *A* and *C*, there exists an armature reaction *OR* in the direction *AC*. This may be resolved into two components, *OD* in the direction of the main flux and *OE* in the direction of the cross flux. As the main magnetic circuit is saturated the additional excitation due to the armature reaction cannot add anything to the main flux. The component *OE* will, however, interfere with the cross flux and disturb the regulation of the machine if not counteracted. To overcome it, a series winding is added to the cross poles. This compensating winding provides for adjustment of the compensation, permitting the neutralization of the resistance drop.

That the compensation is effective is shown by tests made to determine the relation between trolley and generator voltages. One characteristic curve plotted between these voltages shows 30 generator volts at 350 line volts, $33\frac{3}{4}$ at 550, and $30\frac{3}{4}$ at 750. The maximum is $33\frac{3}{4}$ volts.

The low voltage of 32 was selected for the system in which the new motor-generator is employed to minimize weight and size of the machine, to produce the proper voltage for the operation of incandescent headlights and multiple operation of lamps, etc. It also furnishes current for the operation of control equipment if desired.

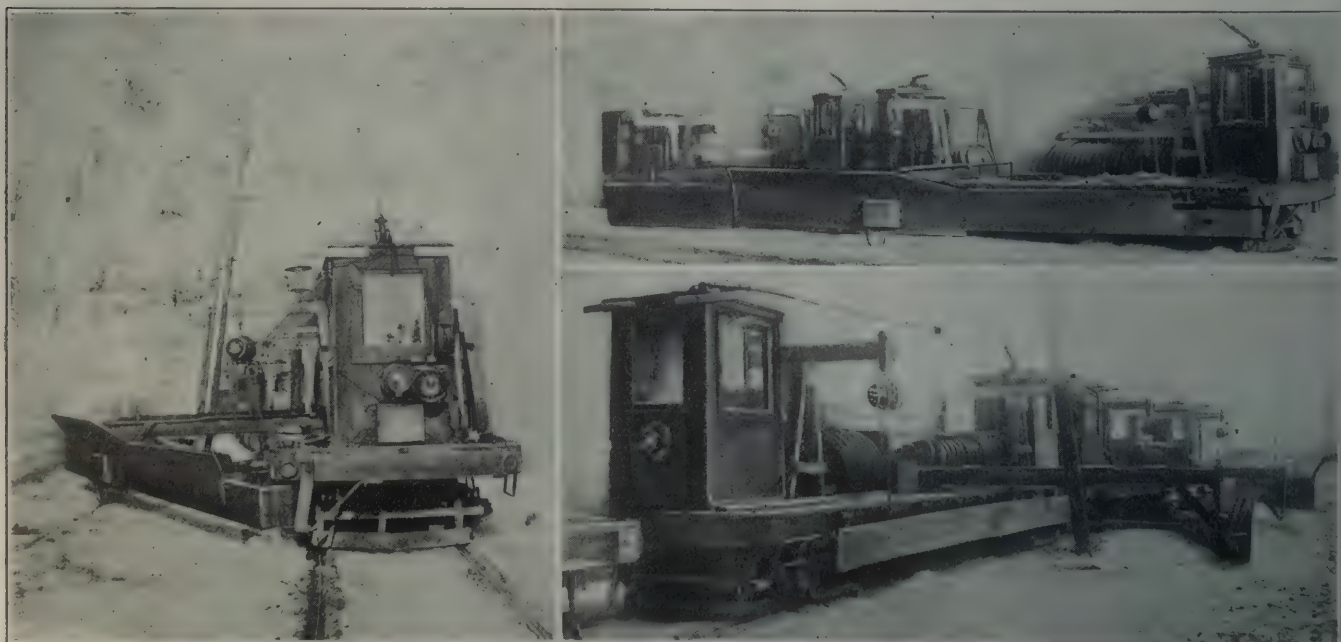
The estimated cost of operation of the lighting of a car equipped with a 250-watt headlight, and one circuit of seven 75-watt and three 25-watt lamps is \$153.50 per year, assuming that the lamps burn 1707 hours. Energy is figured at $1\frac{3}{4}$ cents per kilowatt-hour and haulage at 5 cents per pound per year.

Further details of the lighting system employing this generator will be found in an article by W. J. Walker in the February, 1918, *General Electric Review*, and in an article to appear in an early issue of the *Proceedings* of the A. I. E. E. S. R. Bergman will explain more fully the principles involved in the generator design.

Work Cars Used as Snowplows

SUPPLEMENTING the article printed in last week's issue of the JOURNAL on the use of steel-shod wings on sprinklers and work cars the accompanying three illustrations are reproduced. These pictures have come to hand since last week's article was printed. They show the equipment described in the latter part of that article.

The apparatus illustrated consists of two work cars coupled permanently. Wings are provided on each, that on the front car being used to take off the upper layer of snow from high banks, the one on the rear being set closer to the rail. As was mentioned last week, two additional work cars are used in the rear to augment the propelling power.



THREE VIEWS OF WORK-CAR TRAIN EQUIPPED WITH WINGS FOR LEVELING SNOW, CHICAGO SURFACE LINES

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

St. Louis Strike Settled

United Railways Recognizes Union, but Matter of Wages Will Go to Arbitrators

The strike of the union employees of the United Railways, St. Louis, Mo., was settled on Feb. 7. The agreement was reached when Richard McCulloch, president and general manager, and some directors of the company and a committee of the men met with a special committee appointed by the Chamber of Commerce. This conference continued until after midnight. The agreement reached at that time was ratified by the union at a meeting on the morning of Feb. 8, and cars were again in operation for the evening rush hour on that day. The terms of the agreement are as follows:

1. Right of the men to unionize recognized by United Railways.
2. Men employed in future to be taken in on the preferential shop basis, which means that union men shall be given preference over non-union applicants for work.
3. All old employees of the company to be retained on the same basis they occupied before Jan. 1, whether members of the union or not. All conductors and motormen employed by the company since the start of the strike to be discharged immediately upon ratification of the agreement by the union as a body.
4. The question of wages, hours and other details to be settled at further meetings of committees from the board of directors of the company and the union, these conferences to be held within the next few days.

STRIKE DECLARATION

On the afternoon of Feb. 2 a committee of men left at the office of the company a series of demands including increases in wages which were to be accepted by midnight to avoid a general strike of motormen and conductors. At that time it was estimated that 200 employees and ex-employees of the railway had formed a local union with which the remaining 2500 motormen and conductors were not affiliated in any way. At midnight the union men stopped the cars and the tie-up Sunday morning was practically complete. On Monday, Feb. 4, the company operated sixty cars, on Feb. 5 ninety cars, on Feb. 6 100 cars, and on Feb. 7 about 150.

The strike was accompanied by very little lawlessness. A few cars were stoned on the first day and some glass broken and during the four days a great deal of annoyance was caused by short-circuiting the trolley wire and the rail with gas pipe. In only one case

did the riot result in any injury. This happened to innocent bystanders, two of whom were wounded by stray bullets fired by the police.

On the second day of the strike, the company appealed to the Missouri Public Service Commission for an increase in revenue. The way in which the increase is to be accomplished is not indicated, but the most probable methods are as follows:

ALTERNATIVE REVENUE PROPOSALS

1. Increase to 6-cent fare. (This would increase the total revenues more than \$2,000,000 a year.)
2. Permission to charge 1 cent for each transfer. (This would increase the total revenues about \$1,250,000 a year.)
3. Adoption of a zone system.
4. Accomplishment of increase in earnings by a reduction in taxes. (Net income could hardly be increased more than \$300,000 by this method.)

MEN WANT FORTY TO FORTY-FIVE CENTS

It has been estimated that the advance in wages demanded by the men will increase total wages \$2,000,000 for the year, while the company's net income last year was only about \$600,000, all of which was put into betterments. It is evident, therefore, that to increase wages materially there must be an increase in fare. The present scale of wages varies from 26 to 32 cents an hour according to length of service. The strikers demand a scale ranging from 40 to 45 cents.

Cars for Toronto Delayed

A hearing was held at Toronto, Ont., on Jan. 30 before the Ontario Railway and Municipal Board with respect to the failure of the Toronto Railway to comply with the order of the board requiring the company to put 100 new cars in service by Jan. 1, last. The company introduced as witnesses P. J. Honold, purchasing agent of the New York State Railways, and D. E. Blair, superintendent of rolling stock of the Montreal (Que.) Tramways Company.

Mr. Honold said that the manufacturers had pleaded inability to get steel, owing to the priority of war work, and had contended that they were handicapped by labor shortage. Mr. Blair stated that the Montreal Tramways had secured bodies and trucks for ninety-six cars, but had been unable to secure equipment. During the war deliveries had been slow and equipment ordered on Sept. 1, 1917, had not been delivered. Great difficulty had been experienced in getting motors.

It was planned to continue the inquiry into the car shortage on Feb. 11.

Causes of Labor Unrest

National Mediation Board Points Out Weaknesses in Present Industrial System and Suggests Relief

Greater co-operation between capital and labor is needed in this country in order to secure maximum efficiency. Such is the opinion of President Wilson's mediation commission which has just finished a survey of the labor unrest west of the Mississippi.

Among the causes of unrest the commission says the following stand out:

1. To speak broadly, American industry lacks a healthy basis of relationship between management and men. At bottom this is due to the insistence by employers upon individual dealings with their men. Direct dealings with employees' organizations is still the minority rule in the United States. In the majority of instances there is no joint dealing, and in too many instances employers are in active opposition to labor organizations.
2. Too many labor disturbances are due to the absence of disinterested processes to which resort may be had for peaceful settlement. Force becomes too ready an outlet.
3. There is a widespread lack of knowledge on the part of capital as to labor's feelings and needs and on the part of labor as to problems of management.
4. Wage increases are asked mostly in order to meet the increased cost of living. Such demands should be met in the light of their economic causes.

Too often, in the commission's opinion, is there a glaring inconsistency between American democratic purposes in the war abroad and the autocratic conduct of some of those guiding industry at home. To remove the causes of labor unrest the commission suggests in part the following:

"The elimination to the utmost practical extent of all profiteering during the period of the war is a prerequisite to the best morale in industry.

"Some form of collective relationship between management and men is indispensable. The recognition of this principle by the government should form an accepted part of the labor policy of the nation.

"There is needed the establishment of continuous administrative machinery for the orderly disposition of industrial issues and the avoidance of the waste of disturbances.

"When assured of sound labor conditions and effective means for the just redress of grievances that may arise, labor in its turn should surrender all practices which tend to restrict maximum efficiency."

New York Commissions Report to the State

Review of a Decade of Utility Regulation in the Reports Transmitted to the State Legislature

The Public Service Commission for the First District, embracing the city of New York, recently presented to the Legislature its eleventh annual report for the year ended Dec. 31, 1917.

On July 1, 1917, the commission completed its first decade, having been organized on July 1, 1907. In each year of the ten, the commission has carried on its functions of rapid transit and regulatory work.

The commission says that the past year has been one of the most notable in respect to the construction of commission laws, in that the course of judicial decision has finally clarified the commission's powers and has placed the commission in position to make reasonably effective its orders for the improvement of service and facilities.

\$700,000,000 IN SECURITIES

In the last ten years the commission has passed upon the issuance of nearly \$700,000,000 in securities of the various corporations.

The decade has also seen vast improvement in transit conditions. The passenger traffic upon street surface lines has increased more than 600,000,000 since 1907.

For several years the commission has given its attention to the construction of the new dual system of rapid transit, the world's largest engineering undertaking, which will cost in the neighborhood of \$400,000,000, or more than the cost of construction of the Panama Canal. Its hundreds of miles of track on city and company-owned lines will effect approximately an increase of more than 100 per cent in the city's transit facilities as they existed in 1907.

At the end of the year there remained only five construction contracts to be awarded on the dual rapid transit system. Contracts already let amount to more than \$200,000,000 upon lines to be owned by the city of New York.

The contracts awarded during the year were divided as follows:

Class	Number Awarded	Amount of Contract
Construction	1	\$257,164
Steel	2	1,456,055
Station finish.....	8	2,237,112
Track installation....	3	368,862
Track materials.....	8	302,297
Miscellaneous	19	376,833
Totals.....	41	\$4,998,323

\$100,000,000 FOR RECONSTRUCTION AND EQUIPMENT

Besides the contracts on city-owned lines awarded by the city, the Interborough Rapid Transit Company and the New York Municipal Railway Corporation (Brooklyn Rapid Transit) had either completed or under construction at the end of the year improvements to their elevated railroads amounting to \$52,000,000. The companies have also under way provision

of equipment for all lines amounting to \$56,000,000.

In addition to their payments for new equipment and construction costs of elevated third tracking reconstruction and other improvements, both companies have also contributed substantially to the cost of construction of city-owned lines—the Interborough Rapid Transit Company to the extent of \$58,000,000, and the New York Municipal Railway Corporation to the extent of about \$14,000,000.

The total expenditures of the commission for the calendar year amounted to \$3,253,809, of which \$3,001,420 was defrayed from the city treasury and \$252,389 was paid by the State.

The commission then reviews the new rapid transit lines opened in 1917 and the ones likely to be opened in 1918.

REGULATION OF CORPORATIONS

At the close of the year 1917 there were 104 corporations under the jurisdiction of the commission, seventy-four being operating and thirty lessor companies. These companies had stocks and bonds outstanding amounting to \$1,557,319,355 at the end of the year. Transportation companies had \$1,121,296,001 of this total and the gas, electric and steam companies \$436,023,354. The increase for the year was \$124,398,223.

No stock issues were authorized by the commission in 1917, but bonds were authorized of a par value of \$44,167,200. Action was either deferred upon or proposed issues were disapproved amounting to \$2,632,572. There were also pending at the end of the year applications from other companies yet undecided for security issues amounting to \$5,411,900. Since its establishment in 1907 the commission has allowed issuance of \$696,134,677 in securities out of a total of \$886,633,329 applied for.

WHAT THE UP-STATE BOARD SAID

The Public Service Commission for the Second District of New York, in its statement to the Legislature, reports that under present conditions, recognized as extraordinary and without precedent because of existing uncertainty as to the immediate and ultimate effect upon the commission of the control of railroad transportation by the government, and the not improbable extension of government control to other public utilities, at least indirectly, it has been considered advisable to eliminate general comment from the commission's report.

Due to the existence of war conditions the question of capitalization of public utility companies has assumed more importance than could heretofore be attached to it. Many of the public utility companies have been directly called upon by the federal government

either to furnish energy in large amounts or to establish and maintain additional and enlarged facilities for transportation.

The expansion of facilities for the purpose of meeting these demands has necessitated the procuring of new and additional capital in amounts even beyond those which are ordinarily necessary to enable companies to keep abreast of the ever-increasing normal demand. It has been necessary for the public utility companies to find these additional amounts of capital at a time when the world war had caused financial conditions to have become unsettled, and at a time when the savings of the nation were being borrowed by the federal government on very favorable bases and in unprecedented amounts. That the public utility industry has been able to finance itself at all in the face of conditions such as have existed in the last three-quarters of the year is believed to be a remarkable achievement.

COMMISSION CO-OPERATION

In the present period of stress the commission is lending all possible encouragement to legitimate financial undertakings, and by advice, suggestion and constructive criticism, based upon its wide experience in such matters, is aiding all properly disposed enterprises to solve their financial problems to the end that their service to the public may be maintained and improved.

Stockholders Approve Lease

The stockholders of the Philadelphia (Pa.) Rapid Transit Company on Feb. 8 authorized the board of directors to accept the lease of the projected high-speed city lines. This leaves only the approval of the Public Service Commission to be obtained. The board of directors of the company will meet on Feb. 18 to ratify the lease. The city then will be notified and arrangements will be made to take the matter before the Public Service Commission. After it is submitted to the commission, thirty days will be allowed for protests and suggestions, and then the final hearings will be held.

In discussing the action of the stockholders, W. S. Twining, director of the Department of City Transit, said:

"The action of the stockholders is gratifying because it brings the city and the company into accord on the subject of an operating lease, and thus removes what since 1913 has been an obstacle to transit development in Philadelphia. Until Aug. 17 of last year, when the present lease was submitted to Councils, no progress toward the consummation of a contract had been made. Now that the stockholders have authorized the company to accept the lease, the board of directors probably will meet soon and sign it, after which it will be sent to the Mayor for his signature."

The underlying principles of the lease were discussed in an editorial in the *ELECTRIC RAILWAY JOURNAL* of Jan. 26, page 166.

May Electrify Belt Lines

Tremendous Traffic Demand at Buffalo Uncovers Heretofore Neglected Transportation Artery

The New York Central Railroad which owns and operates a six-track belt line service around the city of Buffalo, N. Y., has been asked by Mayor George S. Buck to electrify two of its tracks and operate cars or trains on frequent schedules. John C. Brackenridge, retained by the City Council to make a survey of traffic conditions on the lines of the International Railway, recommended this improvement as a solution to the transportation problem in Buffalo. It is pointed out that the population of the city has increased almost 100,000 within the last twelve months and that the city railway is unable adequately to handle the large number of extra passengers. The location of new industries in the northern section of the city, far from the homes of the working classes, has greatly increased the transportation problem.

Details of the plan suggested by Mr. Brackenridge propose a charge of 3 cents as fare over the belt line with an additional charge of 2 cents for a transfer to any local line of the International Railway. The New York Central Railroad already has stations at many points along the 15-mile belt line. This line makes a complete loop around the city intersecting the business and residential sections. It is not intersected by any other railroad and for a greater part of the distance the tracks are either elevated or below the streets. More than 60 per cent of the city's industries are located along the line. The belt line crosses all of the east and west-bound surface railway lines on the east side. Mr. Brackenridge is of the opinion that with the electrification of the belt line Buffalo would have a transportation system better than that of any other city of the same size in the world.

T. W. Evans, general superintendent of the New York Central for the western division, which includes Buffalo, is impressed with the possibilities of this new service. He has been in conference with Mr. Brackenridge and members of the Buffalo Street Railway Commission and the City Council. Unofficial reports to the City Council indicate the New York Central is now collecting \$1,750 daily as fares on the belt line under the service as recently improved by the company.

Allowances Increased

Increasing Prices for Materials and Labor Jeopardize Fares Under the Tayler Grant at Cleveland

The street railway committee of the City Council at Cleveland, Ohio, on Feb. 8 approved the Cleveland Railway's request for an increase of 1½ cents per mile in the operating allowance, but cut the requested advance of 3 cents a mile for the maintenance allowance to 1 cent. This will make the allowances

16 and 6 cents respectively, instead of 14½ and 5 cents, as in the past. The company will also be permitted to charge off the deficit of \$500,000 of last year at the rate of \$30,000 a month. President J. J. Stanley fears that, with the continuance of high prices for all kinds of materials and increasing cost of labor, even this will not be sufficient to meet the expenses.

Fielder Sanders, street railway commissioner, says the prospects are rather gloomy for escaping the maximum rate of fare. This rate is 4 cents cash, seven tickets for a quarter and 1 cent for a transfer with no rebate. He said that 15 per cent of the total equipment was in the repair shop and delivery of new cars and materials seemed almost out of the question. Motormen, conductors and other employees of the company are clamoring for more wages. Their demands must be taken up in May.

PARING EXPENDITURES

No money is to be spent this year on new carhouses or extensions of the present houses, and the program for track repairs and replacements calls for just as little expense as possible consistent with safety and the upkeep of the property. No more cars will be purchased than are actually required by the traffic.

News Notes

New Commissioners Confirmed.—The Senate of New York has confirmed the nominations of Charles B. Hubbell, New York, and Frederick J. H. Kracke, Brooklyn, to be members of the Public Service Commission for the First District.

Fire in Toronto.—Fire destroyed the carhouse of the Metropolitan division of the Toronto & York Radial Railway on the west side of Yonge Street south of St. Clair Avenue, Toronto, Ont., on Feb. 5. Six interurban cars were completely burned.

Municipal Extension Opened.—The opening of the Seattle Municipal Railway extension into Ballard was celebrated on Jan. 27. C. B. Fitzgerald, president of the City Council; Mayor H. C. Gill and Superintendent of Streets Case were among the speakers at the ceremony attending the opening.

Strike Declared Off.—The strike of the trainmen of the Chattanooga Railway & Light Company, Chattanooga, Tenn., begun on Oct. 5, last, has been declared off by vote of the members of the local union there. At its inception the strike took on a serious aspect, but the company promptly replaced the men who went out and service was soon restored to normal. The declaring off

of the strike at this time is merely a formality and leaves the present members of the union free agents to seek re-employment.

Minneapolis Union Heard.—Representatives of the union of the Twin City Rapid Transit Company, Minneapolis, Minn., gave their side of the recent strike there to the President's mediation commission at a conference on Feb. 4. Temporary adjustment of the difficulty was effected when the commission visited the Twin Cities.

Search for C. Loomis Allen.—During the past week the daily papers in Syracuse have published several articles in regard to the disappearance on Jan. 10 from Baltimore of C. Loomis Allen, director of the War Board of the American Electric Railway Association. It was reported at first that no clues could be found, but on Feb. 11 the daily papers carried a story that Mr. Allen had suddenly gone to Mexico without notifying his associates in Allen & Peck, Inc. On Feb. 1 his resignation as director of the War Board was presented to the board by J. N. Shannahan.

Programs of Meetings

Central Electric Railway Association

The annual meeting of the Central Electric Railway Association will be held in the Miami Hotel, Dayton, Ohio, on Feb. 28 and March 1. The executive committee will meet at 1.30 p. m. on Feb. 28, and the regular business session will be held at 2.30 p. m. The regular business session on March 1 will convene at 9 a. m. The program for the meeting has not yet been announced.

SINGERS WANTED FOR MEETING

J. F. Starkey, general passenger agent of the Lake Shore Electric Railway, Sandusky, Ohio, is anxious to get the names of anyone who can sing and will join a quartet, perhaps a double quartet, for singing patriotic songs at the coming meeting in Dayton. Those willing to volunteer should notify Mr. Starkey promptly and tell him what voice they sing. If possible a rehearsal will be arranged to take place in Dayton on Feb. 27.

Southwestern Electrical & Gas Association

The general convention committee has decided upon April 15 and 16 as the dates for the convention of the Southwestern Electrical & Gas Association at Galveston, Tex., the headquarters to be the Galvez Hotel. In order to be consistent in the matter of economy the committee has made this a two-day convention instead of a three-day convention as hitherto. There will be no general entertainment for those attending, it being the idea of the committee to economize expense and time and make the meeting strictly a business convention. The details of the program are now being arranged and will be announced later.

Financial and Corporate

Another Abandonment

Ware & Brookfield Street Railway Operating Eleven Miles in Massachusetts to Be Sold

The Ware & Brookfield Street Railway abandoned operation on Feb. 3. The property will be sold for its scrap value unless its future purchaser decides to continue operation. The road is about 11 miles long and has operated in the towns of West Brookfield, Ware, New Braintree and Hardwick, Mass., forming a connecting link in the route between Worcester and Springfield via Spencer and Ware. In April, 1917, the fare unit was increased from 5 to 7 cents. The first six months' operation under the higher fare resulted in about \$2,500 increase in revenue, but the traffic decreased about 20 per cent. The total deficit on Dec. 31, 1917, was about \$188,000.

IN RECEIVER'S HANDS IN 1905

The road was organized in 1900 as the Hampshire & Worcester Street Railway. It went into the hands of a receiver in 1905 and was sold under the decree of the court to the present owners. No dividends have ever been paid and the bond interest has not been met since the reorganization. The gross earnings in 1916 were \$32,299 and operating expenses \$44,847. Taxes were \$440; interest on funded debt, \$6,750; deficit for 1916, \$19,739. In 1916 the road carried 566,773 revenue passengers. The principal items of operating expense were: Conducting transportation, \$11,852; maintenance of way and structures, \$9,699; maintenance of equipment, \$7,620; power (purchased from Central Massachusetts Electric Company), \$11,259; general and miscellaneous, \$4,015. The outstanding bonds total \$135,000 par value.

A few weeks ago, when it was seen that operation could no longer be indefinitely continued under the conditions then prevailing, J. Edward Brooks, president of the company, sent a letter to the selectmen of the various towns served and discussed the future of the property at various conferences. The Ware Board of Trade endeavored to raise local capital to save the property from dismantling, but was unsuccessful. The road was not hampered by jitney competition. Its chief difficulty was low density of traffic combined with high cost of labor and material. Five box cars are owned by the road and there were twenty-two employees on its payroll. President Brooks offered to sell the road to local capital for between \$60,000 and \$75,000, but nothing has come of this offer. The road has not as yet been placed in the hands of a receiver, but it is probable that one will be appointed within about two weeks. Practically no revenue has been derived for trolley express traffic.

All the territory served is rural in character, although some industrial travel has been cared for between Ware and Gilbertville. These points, 4 miles apart, are connected by a branch of the Boston & Albany Railroad.

Annual Meeting in Cleveland

Increased Allowance Wanted for Maintenance and Operation—New Stock to Be Issued

At the annual meeting of the stockholders of the Cleveland (Ohio) Railway on Jan. 30, the following income statement for 1917 was presented:

Operating revenue	\$10,176,125
Actual expenses	7,562,338
Net operating revenue	\$2,613,787
Non-operating income	80,389
Gross, less expenses	\$2,694,176
Taxes	643,108
Net income	\$2,051,068
Interest	1,928,856
Surplus	\$122,212
Obsolete property	524,000
Net deficit	\$401,788

The company has asked for increases in allowances from 5 to 8 cents per car-mile for maintenance and from 14.5 cents to 16 cents per car-mile for operating in order to reduce the deficit more rapidly.

Expenditures for betterments during the year aggregated \$1,219,715. The largest items were for laying 11½ miles of new track, building and equipping a new transformer station on Ashland Road and the purchase of seventy-six new trail cars and twenty-five motor cars. The company invested \$500,000 in Liberty bonds.

With the population estimated as 800,000, the gross receipts per capita were \$12.82. The number of passengers carried was 398,378,894, as compared with 375,382,748 the preceding year. Passengers paid \$9,944,350, or an increase of \$654,450 over 1916.

If approved by the Public Utilities Commission and the federal authorities, the company will offer stockholders of record of March 1, 1918, \$2,700,000 of new stock at par. The right to subscribe will expire on March 15. Subscriptions are to be payable in installments on sixty days' notice.

Proceeds of the sale of stock are to be used to reduce the bonded and floating debt, to pay for extensions, betterments and permanent improvements and for any other purpose found necessary. Should the authorities disapprove of an issue of this size now, the amount will be reduced to the immediate requirements of the company. This is the first time stockholders have had an opportunity to enlarge their holdings since 1914.

Save the Road!

This Is the Plea of the Patrons' Committee to Prevent Abandonment of Taunton & Pawtucket Line

Residents along the line of the Taunton & Pawtucket Street Railway, Taunton, Mass., have not given up hope of saving the road from the scrap heap. The committee of patrons has been very busy soliciting subscriptions to stock in the new company which it is hoped will take over the property. A house-to-house canvass has been announced. Meanwhile the committee has outlined to patrols of the road through placards in the cars the situation with respect to the road and has stated how the committee hopes to accomplish its work. This statement by the committee follows:

FEB. 21 LAST DAY TO ACT

"This railway has been sold at auction for its debts. The sale is very likely to be confirmed in court on Feb. 24; if so, the road passes into the hands of purchasers who do not intend to operate it. They are, however, willing to sell. Therefore the property owners and others interested have until Feb. 21 to raise the money necessary to buy the railway property and keep the road running.

"The present assets of the Taunton & Pawtucket Street Railway, according to a very recent inventory approved by the State Public Service Commission, were more than \$225,000. The sum necessary to be raised by the patrons of this road to secure a successful purchase is \$75,000, because assurance is given the committee that if \$75,000 is raised by the property owners, etc., the balance of \$50,000 will surely be forthcoming.

"Do not depend upon the bill presented by Senator Silas D. Reed, for even if it should pass the Legislature—which is extremely doubtful—it will not be in time to save this road, as we have only until Feb. 21.

PUBLIC URGED TO TAKE STOCK

"The shares are \$100 each and it is up to you to go the limit and take as many as you possibly can and then some. The stopping of this road will cause a vast reduction in the valuation of your property and a very great inconvenience to you and your tenants. We have talked and talked that we must keep the road running. Now let us do it by subscribing to our utmost limit to the fund for the purchasing of this property. The committee will call upon you for your subscription. The committee also has many others to call on, so please be prepared for their coming."

The fare unit on the line has recently been increased from 5 cents to 7 cents, making the through fare between Attleboro and Taunton 28 cents instead of 20 cents. In addition a charge of 2 cents is made for transfers. This change and previous steps affecting the road were referred to briefly in the ELECTRIC RAILWAY JOURNAL of Jan. 26, page 199.

\$7,561,749 Is Dallas Value

This Sum Will Be Used as a Basis in Calculating Profits Under New Franchise

The valuation of the Dallas (Tex.) Railways, the lines consolidated under the Strickland-Hobson management, as fixed by the City Commission, is \$7,561,749. This figure will be used as a basis in calculating profits under the service-at-cost franchise.

The basic valuation of the railway properties, as fixed by the terms of the franchise, was \$4,100,000, with privilege of adding certain items in connection with the acquiring of the Oak Cliff lines and additions for betterments and improvements. An addition of \$100,000 as working capital was authorized. Other additions included amount actually paid for construction of interurban terminal on or before Sept. 30, 1916, \$1,301,516; value of property on Sept. 30, 1916, leased from the Northern Texas Traction Company (the Oak Cliff lines), \$1,665,697, making a total valuation of \$7,167,213. M. N. Baker, supervisor of public utilities, recommended that there be added to this the sum of \$394,536, representing the cost of improvements and betterments since Sept. 30, 1915. The company requested that \$442,186 be added on this account.

Chicago Elevated Gains

Increase in Revenues Gives Gain of \$100,900 in Net Increase Despite Higher Expenses

The combined gross operating revenues of the elevated lines in Chicago for the year ended June 30, 1917, rose \$854,905 or 10.1 per cent as compared to those of the preceding year. Such is the showing indicated by the latest annual report of the Chicago Elevated Railways Collateral Trust, which controls the South Side Elevated Railroad,

pense items. Furthermore, the taxes rose \$141,219 or 19.5 per cent, and the income deductions \$139,255 or 5.7 per cent, these increases overbalancing the gain in non-operating income. As a result the gain in net income amounted to \$100,902 or 7.9 per cent.

The report of the Chicago Elevated Railways Collateral Trust, which is for the calendar year 1916, states that the trust received dividends of \$1,218,991 on stocks owned and interest of \$153,483, making a total income of \$1,372,474. The interest charges totaled \$1,186,815, the total disbursements amounting to \$1,248,674. After providing for \$198,648 of expenses incidental to the extension of secured gold notes, dated July 1, 1914, the trust had a surplus of \$7,848 as of Dec. 1, 1916.

Expenses Outrun Revenues in Columbus

At the annual meeting of the stockholders of the Columbus Railway, Power & Light Company, Columbus, Ohio, on Jan. 29, Samuel G. McMeen, president, reported that the gross revenue for the last year increased \$486,786, or 13.76 per cent, but operating expenses and taxes increased \$838,804. Because of the increase in the cost of coal, which amounted to \$603,190, or 75.41 per cent of the increased operating expenses, the increase in the gross revenue was not sufficient to take care of the advanced prices in all classes of supplies and materials and the greater tax assessments, with the result that a material deficit was shown over the previous year. This explains the reason for passing the dividend on common stock on Feb. 1.

In an address before South Side citizens on Jan. 30, Harold W. Clapp, general superintendent of the company, declared that the rate of fare will have to be raised shortly. He said that

Investor Speaks Up

Praise for Oregon Commission from Man Who Saw His Investment Shrinking With No Buyers

M. S. Kohler, Louisville, Ky., a stockholder in the Portland Railway, Light & Power Company, Portland, Ore., in a communication to the Public Service Commission of Oregon, blamed politics for past troubles of that company. After acknowledging receipt of the order of the commission in the recent 6-cent fare case, Mr. Kohler said in part:

"Personally, as a stockholder and as president of an investment company that has considerable holdings of Portland stock, I want to say it is gratifying to know that the increase in rates has been granted, and that right and justice to the stockholders were equally considered with that of the company's employees and the public.

OUT OF POLITICS

"The report shows that the commission has gone into the question very exhaustively and minutely, and I would infer that what the members do not know about electric railway management or overlooked in their investigation would hardly be worth while mentioning. The commission has well remarked: 'Some who do not realize the changed state of affairs are prone to use their newly acquired powers in belaboring their ancient enemy.' The company has suffered much from the Rushlights, the Dalys and even now a prominent commissioner of Portland is playing to the galleries in the same fashion. It took courage to do right, and the members of the commission deserve great credit that they dare to do their duty as they understood it, in spite of an opposition that is more interested in making political capital for themselves than to consider the interests of the whole city of Portland.

"It will take expert management, even with increased fares, to restore the credit of the railway; the stock has no market and is pressed for sale at nominal figures, without buyers. The water power possessed by the Portland company is a great asset, and were the company compelled to operate by steam alone, with the wages paid the men and the high cost of materials, the 6-cent fare would not by any means stem the tide of bankruptcy which has been starting it in the face."

The Portland decision was reviewed in the *ELECTRIC RAILWAY JOURNAL* for Jan. 26, page 184.

Municipal Railway Lost \$135,497

According to figures of the Public Utilities Department of Seattle, the city's municipal electric railway lines, Divisions A and C, were operated between June 1, 1914, and Dec. 31, 1917, at a total loss of \$135,497. This covers an interest charge of \$1,593 a month on bonds issued for the construction and equipment of Division A. Beginning on Jan. 1 the interest charge was increased

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Gross operating revenue.....	\$9,289,913	100.0	\$8,435,008	100.0
Operating expenses:				
Way and structures.....	\$212,692	2.3	\$184,837	2.2
Equipment	523,156	5.6	459,679	5.4
Power	1,155,093	12.4	991,533	11.8
Conducting transportation	2,407,088	25.9	2,270,081	27.0
Traffic	27,677	0.3	20,610	0.2
General and miscellaneous.....	498,777	5.4	408,321	4.8
Total operating expenses.....	\$4,824,486	51.9	\$4,335,061	51.4
Net operating revenue	\$4,465,427	48.1	\$4,099,947	48.6
Taxes, city compensation and other items..	863,334	9.3	722,115	8.6
Operating income	\$3,602,093	38.8	\$3,377,831	40.0
Non-operating income	*151,589	1.6	*135,694	1.6
Gross income	\$3,753,682	40.4	\$3,513,525	41.6
Deductions—interest and rents.....	*2,386,662	25.7	*2,247,407	26.7
Net income	\$1,367,020	14.7	\$1,266,118	14.9
Dividends	1,176,345	12.6	1,135,543	13.4
Surplus	\$190,675	2.1	\$130,576	1.5

*Intercompany rentals deducted.

the Northwestern Elevated Railroad and the Metropolitan West Side Elevated Railway.

The operating expenses of the combined lines, however, increased \$489,425 or 11.3 per cent, so that the net operating revenue gained \$365,480 or 8.9 per cent. Increases occurred in all the ex-

Council will soon be asked to allow the company to sell fewer tickets for 25 cents than at present, eight tickets being the present rate. In his opinion the service-at-cost plan will be worked out after the war when conditions in the nation again have reached a normal state.

to \$2,093. Mayor H. C. Gill expects that this deficit of more than \$135,000 will be wiped out within three years through the operation of city cars to the north city limits of Ballard.

Notable Progress by Cities Service

Cities Service Company, New York, N. Y., and its subsidiaries report that earnings for the twelve months ended Nov. 30, 1917, exceeded the 1916 figures by more than \$10,000,000. The company says:

"Due to the high operating costs, the net earnings of the public utility subsidiaries did not of course fairly reflect the unprecedented volume of business of the properties, but the oil interests developed to such magnitude as to result in record earnings. Total surplus and reserves of the company increased by \$50 for each share of common stock outstanding in the hands of the public, and on Nov. 29 amounted to \$22,597,906, or nearly \$100 a common share. In the first eleven months of the year \$12,509,436 of surplus earnings became available for reinvestment in the properties, and consequently to augment the values protecting the stocks. In the month of November these surplus earnings amounted to \$1,247,682. From the beginning down to date the total is \$27,056,138. The balance for the common stock was equivalent to 61 per cent, as compared with 37 per cent."

Tacoma Municipal Railway Results

The municipal tideflats railway in Tacoma, Wash., during the period from Nov. 12 to Dec. 31, 1917, showed gross earnings of \$9,573. The expense of operation was \$7,233. The net income was \$2,340. These figures were supplied to the City Council recently by Controller Fred Shoemaker. The line is operated by the Tacoma Railway & Power Company for the city. Mr. Shoemaker stated that the figures for the first six weeks under the new contract dated Nov. 12, 1917, probably would not be fair indication of what the city will get out of the line in months to come, with improved methods of handling traffic, added equipment, etc. According to the controller the railway strike last summer was directly responsible for a deficit of \$4,187 in the operation of the line under the old contract. This amount the city will have to pay the Tacoma Railway & Power Company by warrant on the general fund.

Financial News Notes

Receivership Application Denied.—

At the office of the North American Company, New York, N. Y., it was stated on Feb. 9 that upon conclusion on Feb. 8 of arguments in the application filed on Jan. 7 by a stockholder of the United Railways, St. Louis, Mo., for the appointment of a receiver for that company, the application was promptly dismissed by Judge Dyer of the United States District Court on the ground that the allegations contained in the application did not justify a receivership and showed no cause of action.

Seeks to Take Over Light Company.—

The Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., has filed a petition with the Indiana Public Service Commission, in which it asks authority to buy the common and preferred stock of the West Indiana Utilities Company, which operates the lighting plants at West Terre Haute and Brazil, Ind., for a total of \$121,000 in cash. The Terre Haute, Indianapolis & Eastern Traction Company now sells energy to the West Indiana Utilities Company. The common stock of the latter company totals \$50,000, and the preferred stock \$150,000.

Abandonment of Line Approved.—

The Helena Light & Railway Company, Helena, Mont., has been authorized by the Railroad and Public Service Commission to discontinue service on the Upper Broadwater Street railway from the trestle west to the Broadwater. The commission found the company was operating two almost parallel tracks between Broadwater hotel and trestle, known as the Upper and Lower Broadwater lines. The distance between the lines in the territory involved did not exceed at any point four or five blocks. It was estimated that to put the line in safe and proper condition for traffic at least \$10,000 would have to be expended by the company.

Philadelphia Suburban Issue Offered.

—Bioren & Company, Philadelphia, are offering first mortgage 5 per cent gold bonds of the Philadelphia & Garrettford

Street Railway, Upper Darby, Pa., due on Aug. 1, 1955, of which there are \$3,000,000 authorized, \$1,910,000 outstanding and \$1,090,000 reserved for future requirements. The company is operated by the Philadelphia & West Chester Traction Company as a part of its system, under an operating agreement by which the terminal property at Sixty-ninth Street is jointly used, the Philadelphia & West Chester Traction Company paying the Philadelphia & Garrettford Street Railway sums equal to the semi-annual interest payments on all of these bonds, taxes, expenses and maintenance.

Bonus to the City.—The Helena Light & Railway Company, Helena, Mont., recently tendered City Treasurer Martin Doty a check for \$6,388 as bonus to the municipality on the company's gross earnings for 1917. Under a municipal ordinance adopted some time ago, the company is to pay 1½ per cent on the gross earnings when its receipts show an increase of 20 per cent or more over those of the year 1900, 1½ per cent on the earnings if the gain be 40 per cent or more and 1¼ per cent on the earnings when the increase amounts to 60 per cent, and 2 per cent on the gross earnings in the event the gain totals 80 per cent. Earnings of the railway department for 1917 amounted to \$92,981, an increase over 1900 of more than \$46,059, or about 80 per cent. The amount due to the city of Helena as its share of this sum is \$1,859.

A New Convertible Bond.—Henry L. Doherty & Company, New York, N. Y., and associated dealers are offering for subscription Toledo Traction, Light & Power Company second lien 7 per cent three-year gold bonds due on Jan. 1, 1921, issued in connection with the financing of certain maturing bonds of the company and the extensive additions being made to the subsidiaries of the company at Toledo. The bonds may be converted at any time from July 1, 1920, to Dec. 1, 1920, both inclusive, at the option of the holder, into \$85 par value of preferred stock and \$15 par value of common stock of Cities Service Company for each \$100 principal amount of bonds. If the bonds are called for redemption before maturity the holders are entitled to the conversion privilege after notice. The bonds are secured, subject to the first lien bonds of the company, by the pledge of \$16,829,000 face value of bonds and \$20,563,400 par value of stocks, or a total of \$37,392,400 of securities of operating companies in and about Toledo.

Electric Railway Monthly Earnings

ATLANTIC SHORE LINE RAILWAY, SANFORD, MAINE

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$12,450	\$23,250	\$10,800	\$473	\$11,273
1 " " '16	21,935	32,852	10,917	668	11,585

FEDERAL LIGHT & TRACTION COMPANY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$307,865	\$212,254	\$95,611	\$50,970	\$44,641
1 " " '16	230,174	\$133,385	96,789	49,795	46,994
12 " " '17	2,867,310	*2,010,464	856,846	594,454	262,392
12 " " '16	2,502,142	*1,637,893	864,249	586,046	278,203

*Includes taxes. †Deficit. ‡Includes accruals under rapid transit contracts with city payable from future earnings.

INTERBOROUGH RAPID TRANSIT COMPANY, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$3,740,927	\$2,076,032	\$1,664,895	\$1,102,031	\$552,864
1 " " '16	3,634,246	*1,740,602	1,893,644	999,132	\$894,512
6 " " '17	19,669,015	*11,094,712	8,574,303	6,482,085	\$2,092,218
6 " " '16	19,023,024	*9,178,479	9,844,545	5,973,773	\$3,870,772

NORTHERN OHIO TRACTION & LIGHT COMPANY, AKRON, OHIO

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$574,790	\$343,918	\$230,872	\$122,720	\$108,152
1 " " '16	480,765	273,062	207,703	99,171	108,532
12 " " '17	6,389,608	3,992,670	2,396,938	981,861	1,415,077
12 " " '16	5,170,441	2,662,837	2,507,604	887,661	1,619,943

Traffic and Transportation

Fare Raise by Maine Utility

New Zone Fare Tariff With Six-Cent Minimum Filed With Commission by Company at Portland

The Cumberland County Power & Light Company, Portland, Me., has filed with the Public Utilities Commission a revised schedule of rates of fare on the lines of the Portland Railroad operating in and about Portland.

In brief, the schedule provides a "copper zone" system, similar to that in use in Milwaukee, Wis., Worcester and Holyoke, Mass., Concord, Mass., New London, Conn., and other cities. A central zone, with a 6-cent basic fare, is proposed to cover practically all of the thickly settled portion of Portland proper and the greater part of South Portland. Outside the central zone are a number of other zones, each approximately 1 mile across. The zone rate is 2 cents. The longest route is the ride from Portland to Saco, with a total fare of 32 cents. The fare to Yarmouth will be 24 cents and to Old Orchard Beach, a popular shore resort, 28 cents. Only ten days ago the commission sanctioned the withdrawal of "cut rate tickets" on the Westbrook Line.

The new rates will become effective on March 11 unless suspended by the commission.

The company has entered upon a campaign of publicity as to the new rates. Advertising space is being used in all the local papers, leaflets are being distributed in the cars, and placards are being placed in car windows. The company has also covered the ground fully in communications to the city governments and other civic bodies interested.

A statement in regard to the proposed increase was made by A. H. Ford, vice-president and general manager of the company, recently. Mr. Ford said in part:

FURTHER DELAY IMPOSSIBLE

"We have put off this step as long as possible. It costs us more to maintain the service to which the public is accustomed than the public pays us. That is all there is to it.

"We will not only put all the facts before the Public Utilities Commission; we shall, through the press and otherwise, put them before the public. We feel that enlightened public opinion should not only be informed but consulted, and we desire suggestions as to how to get the additional revenues that are indispensable for the continuance of good service. We have nothing to conceal.

"This problem is not peculiar to Portland. More than 150 companies have obtained increased fares or have taken the necessary legal steps to get them; but many have gone into receiver's hands. One such company is the Bay State Street Railway of Massa-

chusetts, the second largest in mileage in America, despite the fact that its fares were increased only last summer. Several other New England companies have sold their lines for junk.

"If we were forced to reduce service, in order to cut expenses, the result would be:

"1. Cars could not move as frequently.

"2. Cars would be crowded.

"3. Cars could not be kept fresh and clean.

"4. The roadway and equipment could not be maintained.

"5. Rails could not be renewed.

"6. New sections would go undeveloped.

"The prosperity of the city and its railway go hand in hand. The whole matter is simply a business inquiry. The main interest of the public is that its service be kept up. Our business is not a private matter. We ask that the public's judgment be reserved until we have given them all the facts."

The date for the hearing on the application of the company has been set for Feb. 25.

Commission Replies to City

The Public Service Commission of the State of Oregon advised the city of Portland on Jan. 28 that if the City Council will present evidence showing that the commission's 6-cent fare order to the Portland Railway, Light & Power Company was erroneous or without justification, the commission will reopen the case, but it denies the resolution of the Council asking for a rescinding of the order on the ground that the commission had no jurisdiction to issue it. The commission asserts that it cannot consider the jurisdictional question involved, as the Attorney General, its legal adviser, had ruled that the commission had jurisdiction in the case. The commission makes it plain, however, that it will not reopen the case unless the application for rehearing is accompanied by evidence from the Council that the order was without justification.

The City Council has retained Judge Martin L. Pipes to assist City Attorney La Roche in contesting the 6-cent fare order. Complaint of the city against the company will be filed in the Circuit Court in the immediate future, and will involve the question of the right of the commission to alter the 5-cent fare provision, and also several other questions pertaining to jurisdiction in the case.

Commissioner Bigelow on Jan. 30 submitted to the Council an ordinance providing for the revocation of all the railway franchises of the company on the ground that in charging a 6-cent fare the company is not complying with the requirements of its franchise.

Connecticut Brief Filed

Counsel for Hartford Urges Zone System With Five-Cent Minimum Rather Than Flat Six-Cent Rate

The city of Hartford, Conn., has filed its brief with the Public Utilities Commission in connection with the case growing out of the petition of the city to the commission to require the company to return to a 5-cent fare in Hartford. The reply of the city was made through Corporation Counsel Francis W. Cole. The legal representative of the city disagrees with the representatives of the company that in so far as Hartford is concerned there is any advantage to that city under the scheme of organization of the company in considering all the lines that it operates as a unit. He expresses the belief that a Hartford company, with all its lines profitable, would have credit as good or better than the Connecticut Company and could purchase just as advantageously. He says that there seems to be no justification for Hartford bearing the burdens of lines in Waterbury, Bridgeport, Stamford or New Haven.

ZONE SYSTEM WITH FIVE-CENT CITY MINIMUM

Mr. Cole reviews the testimony as to the financial prospects of the company. In this connection he says that choice will soon have to be made between a zone system with a 5-cent minimum and a further increase to a flat 7 or 8-cent fare. If this is what the company is coming to, he thinks the company had better be compelled to do it with a 5-cent minimum fare in cities, which fare caters to the short and profitable rider, than to be forced to adopt the same plan with a 6-cent minimum fare, which is inconvenient for the public and kills a considerable percentage of the traffic.

Mr. Cole sums up the city's claims as follows:

1. That Hartford has a right to have its railway lines considered separate and apart from other properties of the Connecticut Company with a view to determining whether or not a rate of fare in the city of Hartford is reasonable.

2. That it is not deprived of the above right by the fact that the company's books and accounts have not been so kept as to make available figures on revenue received and cost of operation within the city.

3. That if the company needs additional revenue, it should be obtained by an equitable rearrangement of its fare zones.

4. That the 6-cent fare is unreasonable as a minimum fare as well as impractical and unjust to the short rider.

5. That as far as appears from the evidence, a 5-cent fare is a reasonable maximum fare within the limits of the city of Hartford.

In conclusion Mr. Cole says:

"Notwithstanding the difficulties which may stand in the way of evolving a just fare structure, it is the duty of public service officials to take hold of

Review of Salt Lake Fare Decision

Utah Commission Abolishes Four-Cent Tickets, But Refuses the Request for a Transfer Charge

By a unanimous vote the Public Utilities Commission of Utah, as noted previously in the *ELECTRIC RAILWAY JOURNAL*, decided recently to permit the Utah Light & Traction Company, Salt Lake City, to discontinue the sale of 4-cent tickets and to establish a straight 5-cent fare. The order went into effect on Jan. 1. The company was required to honor 4-cent tickets purchased before Jan. 1 through the month of January and to redeem such tickets for cash up to and including Feb. 28. In connection with the order to the company the commission reported its findings as follows:

1. Rates, fares and charges fixed by a franchise ordinance prior to the enactment of the law creating the commission may be changed by the commission, where authority to fix such rates was not expressly delegated to the municipality by the Legislature.

2. Present revenues of petitioner found to be insufficient.

3. Commutation books of fifty tickets for \$2 abolished.

4. Permission to charge 1 cent for transfer denied.

5. Permission to establish additional 5-cent rate zone to Senterville and Sandy-Midvale lines denied, but a new division of zones prescribed so to afford a slight increase in revenue.

6. Free transfer privilege ordered at Midvale Junction to or from Sandy and Midvale.

7. Not more than one 5-cent fare may be charged for a ride wholly within Bountiful City and Murray City.

8. Physical valuation for rate-making purposes should be ascertained.

The company asked (1) for relief from the 4-cent ticket; (2) permission to charge 1 cent on transfers issued; (3) the right to add a 5-cent zone on two of its suburban lines on which the fare was 20 cents to the termini—proposing to make the fare to the termini 25 cents. A new tariff to this effect

(Concluded from page 339.)

the various problems and solve them. Thus only can the burden of intolerable traffic conditions be removed from the shoulders of the workers in Hartford.

"Electric railway operation should be so conducted that it means fairness and service to the entire public, urban as well as suburban. If it were so conducted the result would be that the suburbanite would take upon himself the real cost of his own transportation and the car-riders living in each city would be relieved from the obligation of paying partly in cash and partly in poor service for the cost of carrying passengers to suburban towns or carrying them in other cities a considerable distance away, and with which there is in reality no community of interest so far as the carriage of passengers upon electric railways is concerned."

was filed with the commission on July 30, to become effective on Aug. 29. The tariff was postponed and a date for hearing set by the commission. The hearing, together with the argument, including several postponements, took up the time from Aug. 29 to Nov. 15, on which latter date the hearing was concluded by final argument on the part of petitioner and protestants.

The company asserted that in view of increasing cost of labor and equipment it was imperative that additional revenue should be obtained by means of increased fares.

The protestants contended that the conditions as set forth did not justify the application being granted and that the commission was without jurisdiction, in that existing franchise agreements could not be set aside.

On the matter of jurisdiction the commission said:

"There is no express authority in the constitution of the State or of the acts of the Legislature that would authorize the cities or towns in this case to fix rates that cannot be modified or changed by authority of the Legislature, and therefore the contention of protestants cannot be sustained. To take any other position would be to nullify important provisions of the act creating the commission and setting forth its duties and powers."

With respect to the valuation of the property of the company the commission said:

"A way must be found to insure investors with certainty the treatment their investment will receive if public service by private initiative is to be continued. A fair valuation of the property for rate-making purposes should, therefore, be ascertained. The commission recognizes that it is the proper body to ascertain this fair valuation of the physical property of the petitioner devoted to electric railway service, but to make such valuation would require considerable time and expense to the petitioner and to the commission, and, in the meantime, on the face of the showing made, it appears to us that the petitioner is entitled to some measure of relief if it is to maintain adequate service."

SOME RELIEF NECESSARY

In reviewing the probable effect of the change in rates on the earnings of the company the commission said:

"The petitioner has also compiled the hypothetical results of operation for one year, based on the application of the revised tariff proposed by it, applied to the operations of the first six months of 1917, which shows that if the commission granted all that was asked for by the petitioner, the net returns on a depreciated property valuation of \$6,370,582 would be 5.4 per cent.

"It could not be expected that the petitioner at this critical time should

obtain such relief as to make its investment whole. Part of the burden occasioned by the world war should properly be borne by the company.

"That relief is necessary appears to us to be evident, and it should be granted, in the absence of evidence to show that the company has been making such profits in the past as would carry its increased expenses over the present period, and until conditions have changed and become normal."

Skip-Stop Being Considered

Bulletin of Fuel Administration Describes Advantages—Conferences Held, But No Decision Reached

On Feb. 8 the United States Fuel Administration issued a bulletin that it has had under consideration for some time past, the question of putting into effect "skip-stop" schedules on urban and interurban electric railways. Conferences have been held with railway heads, officials of public utilities commissions and statistical experts and much information has been gathered. However, no decision has been reached and definite conclusions will be delayed until all the facts have been assembled and digested.

The Fuel Administration says that the proposition before it is substantially as follows:

"The regular passenger stopping places for electric railways shall be spaced so as not to exceed eight per mile in urban districts and six per mile in suburban districts. On interurban lines the regular passenger stopping places shall not exceed four per mile. Where safety stops are necessary they shall be combined, when practicable, with the passenger stops.

"Some of the points made in favor of the order are:

"Three times as much power is required to make an electric car stop and start as to run a block.

"There are approximately fifty million car stops made in the United States each day. The skip-stop schedule would eliminate one-third of these. The elimination of six billion stops a year, together with the regulation of car heating, will bring a fuel saving of not less than 1,500,000 tons of coal a year, which will meet the fuel needs of 300,000 average families.

"The reduction of car stops, it has been stated, will in a large measure serve to relieve the congestion of the overloaded street railway systems of the country and will enable better and quicker service to the individual. Under the present conditions of operation the number of stopping places for electric cars in urban districts is often fourteen or more per mile, and in suburban districts and on interurban lines is often correspondingly excessive when the character of the districts is considered.

"Students of street railway operation who favor the skip-stop order argue also that, by reason of the coal transportation shortage, there would be far less inconvenience to the public, and less interference with general business,

through reducing the number of electric railway stopping places than through curtailing service.

"The use of a reduced number of stopping places for electric cars was introduced in Cleveland, after a favorable vote by the car traveling public, as a means of obtaining better service and not of saving fuel. The plan has been adopted with success in Detroit, Buffalo and other cities, according to figures submitted in semi-official reports and statements of car users."

Suggestions for Buffalo
Expert Favors Complete Rerouting—
Says a Total of 770 Cars
Is Needed

After an investigation covering a period of almost four weeks, John A. Brackenridge, New York, who has been retained by the City Council of Buffalo, N. Y., to make a survey of traffic on local lines of the International Railway, has reported that the company needs 770 cars to handle passengers during the peak-load hours. When it has received the last of the cars now being built for the company, the International Railway will have 834 cars or a surplus of sixty-four cars over its actual requirements. For some time past the company has had an average of 524 cars in daily service and 249 cars out of commission undergoing repairs. It is the opinion of Mr. Brackenridge that the company should never have more than 10 per cent of its equipment out of service.

The Municipal Traffic Commission has sent a recommendation to the City Council asking that action be started against the railway to abrogate its 999-year franchise. No action has been taken by the City Council on this matter, but the corporation counsel and the city law department have been instructed by Mayor George S. Buck to investigate the method of procedure and to prepare evidence for alleged violation of its franchise on the part of the railway.

E. J. Dickson, vice-president of the railway, has been furnishing Mayor Buck weekly with a statement of crippled cars undergoing repairs. This statement is in accord with the recommendation of Mr. Brackenridge. In commenting upon the large number of crippled cars, Mr. Dickson said that the increase in crippled cars was occasioned by the extreme cold weather and the very bad conditions that prevailed in the streets.

Complete rerouting is recommended by Mr. Brackenridge. To assist in this work a large map is being prepared by Mr. Brackenridge showing the direction of traffic and where traffic is the heaviest. The city has been divided into numbered zones each representing a section of the city one-half mile square. The population in each square is indicated. Veins of various colored ink show the direction of travel to and from the industrial sections and retail sections during all rush-hour periods.

San Francisco Trans-Bay Rate Case

Joint Plan of Operation Suggested by Opponents to Increase. After a Week's Discussion Case Continued for Further Study of Plan

The hearing of the trans-bay rate case of the Southern Pacific Company and San Francisco-Oakland Terminal Railways, the Key Route, before the Railroad Commission of California, was continued on Jan. 24. The application of these companies for increase in suburban fares was noted in the *ELECTRIC RAILWAY JOURNAL* of Dec. 1, 1917, page 1011. The hearing beginning on Jan. 24 continued for one week, during which time many witnesses were called. C. W. Durbrow represented the Southern Pacific and W. E. Creed the San Francisco-Oakland Terminal Railway. The Oakland Chamber of Commerce, the Berkeley Chamber of Commerce, the city of Alameda and the city of Berkeley were represented.

J. J. Jessup, former city engineer of Berkeley, called attention to the surplus service rendered by the two companies in Berkeley. Some of the parallel lines are only 600 ft. apart. A. F. St. Sure, city attorney of Alameda, testified that the ordinances granted by that city in 1914 under which the suburban lines operate are for thirty-four and forty-five years' duration and call for a 5-cent fare in the city limits, a 10-cent fare between San Francisco and Alameda, and a commutation rate of \$3 a month. A. Kibbe, valuation expert of the Key Route, testified that his company might be able to maintain a 10-cent fare on the profitable lines, but could not do it on a commutation rate. He stated further that while the company had been losing money on the operation of the Key System, some of the individual lines were profitable. The testimony of Robert Adams, assistant auditor of the Southern Pacific Company, showed that there had been an increase of \$154,000 in the earnings of the Southern Pacific suburban system in Alameda County in 1917, as compared to the 1916 earnings. The electric service is charged with 25 per cent of the cost of maintaining the stations.

John S. Drum, a director of the San Francisco-Oakland Terminal Railways, presented a reorganization plan, based upon the valuation of \$17,695,818 placed upon the system by the Railroad Commission. Under this valuation Mr. Drum would provide 70 per cent in 5½ per cent bonds at 90, and 25 per cent preferred stock at 80, and the balance in common stock in such amounts as the Railroad Commission may approve. Taking this as a basis he outlined the necessary earnings of the company as follows:

Operating expenses, including \$178,066 depreciation on equipment	\$3,771,075
Taxes	247,166
Depreciation reserve	382,775
Bond interest	756,995
Margin of safety for bonds	196,154
Dividends on stock	341,546
Gross earnings necessary	\$5,695,711
Estimated gross revenues under present rates	4,754,928
Necessary increase	\$940,783

The increase of \$940,783 it is proposed to raise by the increase in the trans-bay rates which the company is now seeking.

COMPOSITE OPERATION SUGGESTED

A composite scheme of operation was suggested by B. D. Marx Green and outlined by Robert N. Prouty, former assistant professor of railroad engineering at the University of California, and now connected with the Berkeley city engineer's office. Mr. Prouty stated that a saving of \$1,171,000 could be made by the two companies by combining transportation facilities, and to bear out this statement he drew attention to the following points: Three systems are now in operation, each connecting with ferry boats at separate terminals. Seven boats are operated on all-day service, one extra boat is used at the busiest period of the day, while four other boats are held in reserve. In addition, one boat goes to the Western Pacific terminal to meet main-line trains and three freight boats operate on the Oakland harbor route. The latter route, however, was not considered in the system outlined.

ONE FERRY SUFFICIENT

Mr. Prouty pointed out that one ferry line operating six boats to the Oakland mole could take care of the daily rush hour traffic. A saving in train operation, which would reduce the cost of power and maintenance, could be effected by eliminating the Alameda mole and terminal; Key Route mole and terminal; Key Route subway and power house; several lines of each company in districts where they parallel each other in Oakland and Berkeley, which are solely competitive; and a portion of the Southern Pacific lines leading from the Alameda mole to Alameda.

Mr. Prouty estimated that the trans-bay traffic of 1917 operated as a composite system such as the one outlined, would have netted a profit of \$1,088,768, or 7.26 per cent on the investment of \$15,000,000. His statements were based on the exhibits of operating costs of the two companies from which he made theoretical combination of the resources and facilities of both.

COMPANIES WANT DETAILED INFORMATION

The final hearing in this series of sessions on the case was held on Jan. 30, when counsel for the two companies demanded detailed information as to operating costs under the system outlined by Mr. Prouty. Just what information should be furnished and the length of time that should be allowed for its compilation will be determined upon by Richard Sachse, chief engineer of the Railroad Commission. It is believed that several months may be allowed for the preparation of these data. A date for continuation of the hearing is to be announced later.

Prospects of Quick Relief

First Section of Beeler Report on Washington Acceptable to Both Commission and Company

Announcement is made that the first section of John A. Beeler's report on the Washington traffic situation as abstracted in the *ELECTRIC RAILWAY JOURNAL* for Feb. 2, page 223, has been accepted in full by both the Public Utilities Commission of the District of Columbia and by the Capital Traction Company. The railway, in fact, agreed on Feb. 6 to put Mr. Beeler's recommendations into effect voluntarily without awaiting the formality of a hearing. This is doubtless a record in the acceptance and early enactment of recommendations for traffic relief.

The principal recommendations of Mr. Beeler were a 40 per cent cut in stopping places in the congested section, double-berthing, front-end fare collection, limitation of turn-backs at the New York Avenue crossover through routing of Chevy Chase cars; and certain changes dependent upon the municipality, such as one-way traffic, raised safety platforms, traffic policing and automobile parking.

The second section of Mr. Beeler's report, which deals exclusively with stops, is printed elsewhere in this issue.

Increase for Aurora Line

Company Allowed Two Cents a Mile but Must Retain School Tickets and Low Rates in Two Cities

The Public Utilities Commission of Illinois has granted to the Aurora, Elgin & Chicago Railroad, Aurora, Ill., permission to file a new fare schedule, establishing passenger fares based on 2 cents a mile, with a minimum charge of 5 cents, commutation ticket rates and the various items as set forth in the company's proposed tariff, except that the so-called school tickets shall not be limited to the use of school children, but may be used by all children up to eighteen years of age. The company is not permitted to cancel its six-for-a-quarter tickets in Aurora, and its six-for-a-quarter tickets in Elgin until further order of the commission.

NEW TARIFF FILED IN DECEMBER

The company filed with the commission on Dec. 1, a new tariff in which it proposed to advance its fares as reviewed in the *ELECTRIC RAILWAY JOURNAL* of Dec. 15, 1917, page 1096, and proposed also that the new rates become effective on Jan. 1. After two hearings in the case, the commission on Dec. 28 issued an order suspending the tariff until May 1, 1918. Further hearings were conducted in January, and on Jan. 21 the company made a motion, after a notice to all objectors, that the commission enter an order putting into immediate effect the rates as set forth in its tariff.

Figures submitted by the company setting forth operating results for the first ten months of the calendar year

1917, as compared with figures for similar periods in the three preceding years, showed that although operating revenues had increased, the advance had not kept pace with the increase in operating expenses. During the first ten months of last year the company expended \$100,853 more for coal than in the same period in 1916. In the single item of brakeshoes it was shown that the increase in cost for 1917 over the preceding year was \$567. It was stated that under the order of the federal government effective Nov. 1, 1917, the cost of coal will be further increased about \$45,000 a year. The company must meet certain financial obligations falling due in the near future. It also expects to increase the wages of its employees.

The commission decided that the company's request should be granted in part, and that the changes be made effective from Feb. 1.

Removing Fare Opposition

Representative of Scranton Railway Urges Council Not to Oppose Fare Increase

C. L. S. Tingley, vice-president of the American Railways, Philadelphia, Pa., which controls the Scranton (Pa.) Railway, made an offer to the Council of Scranton on Feb. 1 that the local railway would agree to increase its annual appropriation to the city from \$10,000 to \$20,000 if the Council withdrew its objection to the proposed 6-cent fare schedule.

The Council promised to consider the matter and submit an answer to the company soon. Later, P. J. Shea and Lawrence Hart, representing the employees of the company, appeared before the Council to urge the withdrawal of the objection on the ground that 500 employees of the company are to receive a wage increase if the 6-cent fare is permitted.

TIME SIX-CENT FARE WILL CONTINUE

Mr. Tingley said that the matter of the length of time the 6-cent fare would continue in force was one for the Public Service Commission to decide. If in six months or a year or two years there was a return to normal conditions, then it would be for the Public Service Commission to order a reinstatement of the old 5-cent schedule. As long as conditions warranted the 6-cent fare, that schedule would operate. Mr. Tingley was of the opinion that the Public Service Commission would sanction any agreement of the character suggested between Council and the Scranton Railway.

The written offer from the company was to the effect that the company would increase its annual donation to the city to \$17,500 and would also agree to sell seventeen tickets for \$1. Mr. Tingley later said that the company would increase the payment to the city by \$2,500 over the written offer, or to \$20,000.

Another New York Increase

Six-Cent Fare Granted for New York Line of Waverly, Sayre & Athens Traction Company

The Public Service Commission for the Second District of New York on Feb. 1 granted authority to the Waverly, Sayre & Athens Traction Company to increase its rate of fare within the limits of the village of Waverly from 5 to 6 cents.

The Waverly, Sayre & Athens Traction Company operates in New York State only in Waverly. It has three lines covering almost 11 miles. One line operates in Sayre, Pa., another in Waverly through Sayre to Athens, Pa., and a third line from Waverly through South Waverly to Sayre. The determination of the case was complicated by these interstate operations. There was no opposition at the hearing.

It was asserted by the company that its New York State line does not yield a sufficient return. A surplus in operation was indicated by the company's accounts in each year except 1915. It was shown, however, that the president of the company owns all but six shares and that there are outstanding bonds of \$460,000. Most of the bonds are owned by the president, who has each year surrendered and cancelled the interest coupons.

The commission, in conclusion, said: "While the evidence relating to the New York State property and operations taken in connection with the general situation of the roads exhibits a state of affairs demanding that the relief asked for be granted, the company is advised that while the New York State operation is probably the least remunerative it is closely interlinked with the interstate operation. The company should consider carefully the wisdom and necessity of asking that its other patrons share the burden. In fact, some adjustment must be made, because passengers riding solely in New York cannot be charged 6 cents while passengers over the same line and transferring into Pennsylvania pay 5 cents."

Asks Ten-Cent City Fare

The locally published statement that the stockholders of the Titusville (Pa.) Traction Company have decided to abandon the road on May 1 is not quite accurate. According to an authoritative source, the board of directors passed a resolution to the effect that if the City Council of Titusville did not approve the company's application for an increase of fare from 6 cents to 10 cents, it might be compelled to cease operation.

The road is not a paying proposition and with the increase of overhead, wages, etc., the company, not securing a return on the investment, felt indisposed to continue to make up the annual deficit. It is believed, however, that the Titusville community and its Council will amend the ordinance so that the higher rate will prevail.

Rochester Will Appeal

**Will Carry Up Fare Case Decided
Against It by the State Supreme
Court**

Corporation Counsel Benjamin B. Cunningham of Rochester, N. Y., has announced that the city will appeal to the Court of Appeals from the decision of Supreme Court Justice Wesley O. Howard, Troy, who denied the city's application for a writ prohibiting the Public Service Commission from hearing the Rochester fare case.

The city contests the right of the commission to hear the case on the ground that the fare was fixed by law passed after the public service commission law and on the ground that the commission has no authority to invalidate the franchise contract between the city and the railway company which stipulates that a 5-cent fare shall be charged.

Emergency Rates in Sheboygan

**Wisconsin Commission Authorizes
Eastern Wisconsin Electric Com-
pany to Raise Rates**

The Railroad Commission of Wisconsin under date of Jan. 29 rendered its decision in connection with the application of the Eastern Wisconsin Electric Company to increase its power and lighting rates, with the exception of the residence lighting rates, in the city of Sheboygan.

In its application the company requested permission to increase the rates 0.75 cent per kilowatt-hour, and to discontinue the sale of six tickets for 25 cents. In its decision the commission granted authority to increase the power rates and all lighting rates other than the residence lighting rates 0.25 cent per kilowatt-hour beginning Feb. 1 and continuing to Aug. 1 of this year, at which time the former rates again become effective, unless upon application the commission approves of a continuance of the rates granted under the present emergency order. The minimum lighting rate was reduced from \$1 to 75 cents, and permission was granted to the company to discontinue the sale of six tickets for 25 cents for the period mentioned.

OTHER APPLICATIONS MADE

The company has also made application to the Railroad Commission for authority to increase its lighting and power rates at Fond du Lac 1½ cents per kilowatt-hour and to eliminate the sale of the six tickets for 25 cents at that point, and an application has been filed and hearings held in connection with the elimination of eight tickets for 25 cents on the Oshkosh property of the company. No decisions have as yet been rendered in connection with these last two applications made by the company.

The company operates 34 miles of railway and does a general lighting and power business.

Transportation News Notes

Against One-Man Cars.—The City Council of Dubuque, Iowa, at a recent special meeting, tabled the petition of the Dubuque Electric Company for permission to use one-man cars and amended the ordinance which prohibits the use of the cars in that city.

Company Publication at Joliet.—J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, Joliet, Ill., contemplates the publication of a weekly bulletin, which will have as its object the cultivation of better understanding between the company and its patrons.

Relief from Service Order Denied.—The Public Service Commission of West Virginia has refused to modify its order of Dec. 11, 1917, prescribing certain standards of service for the Wheeling Traction Company on its Moundsville-Wheeling line. The order as issued originally was made effective from Feb. 1. The company sought to obtain a stay of the order until March 15.

Fare Ordinances Presented.—Two ordinances have been presented to the City Council at Frankfort, Ky., one providing for an increase in fares on the city lines of the Kentucky Traction & Terminal Company from 5 to 6 cents and the other for increases on the interurban lines so far as the city is interested. They are to be supported by a detailed statement of cost of operations from the railway.

Pennsylvania Fare Hearings on Feb. 19.—The Public Service Commission of Pennsylvania has fixed Feb. 19, in Harrisburg, as the time and place for a hearing of complaints against electric railways that have asked permission to advance their fares from 5 to 6 cents in cases where such advances are alleged to be in violation of ordinances under which the companies hold their franchises. Among the cities said to be included in the protests filed with the commission are Pittsburgh, Scranton, Shamokin and Ashland.

Corporation Counsel to Act in Case of Fare Request.—The City Council of Seattle, Wash., has authorized Hugh M. Caldwell, Corporation Counsel, to take such action as he may regard as necessary to prevent the Public Service Commission from acting in the event the Puget Sound Traction, Light & Power Company petitions the commission for permission to increase railway rates. Mr. Caldwell advised the Council that in his opinion the commission has no right to invite or consider such an application.

Pro Bono Publico Fined.—A decision recently handed down by Circuit Judge Tucker, Portland, Ore., affirms the conviction in the Municipal Court of Albert

Stevens, a jitney driver "employed" by the so-called "Pro Bono Publico" Club, and declares that the organization and operation of the "Club" for a short time last fall was nothing but a subterfuge employed by the local jitney men in an effort to evade the anti-jitney ordinance passed by the voters of Portland. Judge Tucker confirmed the \$25 fine placed on Stevens by the Municipal Court.

One-Man Cars Again Demonstrate Their Worth.—According to reports, the one-man cars installed in Vancouver, Wash., by the North Coast Power Company are proving entirely successful. The three car lines include the Orchards-Sifton interurban line, extending 7 miles northeast from Vancouver; the Capitol Hill line, reaching the residence section of the western part of the city, and the line from the depot to the bridge. One-man operation was resorted to by the company as its last hope of being able to operate the railway lines at a profit.

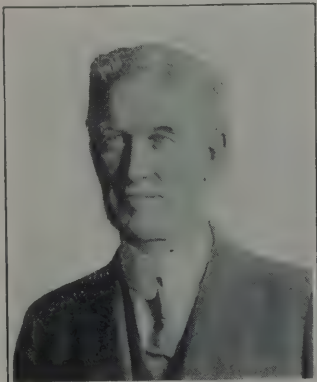
Enforcement of Jitney Ordinance Postponed.—Enforcement of the recently enacted jitney ordinance in Dallas, Tex., was delayed till Feb. 1 by order of the City Commission. This action was taken on application of the Dallas Jitney Drivers' Association and others, who took the position that the new ordinance contained much of the restriction in the old ordinance now before the Texas Supreme Court on application for a writ of error from the Court of Civil Appeals at Dallas, and that the City Commission should await the decision of the higher court before enacting a new ordinance containing these provisions.

The Three "C's."—The Twin City Rapid Transit Company, Minneapolis, Minn., in a recent newspaper display advertisement 9 in. wide by 10 in. deep, told very effectively how much more it is costing at present to furnish electric railway service than it did before the war. Percentages of increases in costs were presented in a table containing eighteen typical items. The company said that the three big "C's" of the electric railway business are coal, copper and cars. As a specific instance of increased prices it was pointed out that the cost of a car, which is about equally divided between material and labor, had increased more than 60 per cent since 1914.

Wants Board to Require Adoption of Mr. Witt's Suggestions.—The City Commission of Trenton, N. J., has asked the Board of Public Utility Commissioners for an order to direct the Trenton & Mercer County Traction Corporation to make certain improvements recommended in the report of Peter Witt, by Sept. 20, 1918. The company, under the rules of the commission, has two weeks in which to file an answer, after which a date for a public hearing will be fixed. The recommendations of Mr. Witt included the suggestion that the company purchase fifty one-man cars. His findings were reviewed in the ELECTRIC RAILWAY JOURNAL for Jan. 19, page 138.

Personal Mention

T. J. Day has been appointed general freight agent of the Pacific Electric Railway, Los Angeles, Cal., succeeding to part of the duties performed previously by D. W. Pontius. Mr. Day has been in the service of the Pacific



T. J. DAY

Electric Railway for ten years, and has had twenty-eight years of railroad experience, beginning with the Denver & Rio Grande Railroad. He was formerly assistant in charge of freight operation of the Pacific Electric Railway.

Harry M. Slater has been appointed chief transportation rate expert of the Public Utilities Commission of Illinois.

Murray Parsons has been appointed roadmaster of the Visalia Electric Railroad, Exeter, Cal., to succeed Samuel W. Card.

J. J. Mahoney has been elected first vice-president of the Fresno (Cal.) Interurban Railway to succeed Paul C. Fratessa.

James Favor has been appointed general manager of the Central Power & Light Company, Walnut Ridge, Ark., to succeed John F. Wilson.

W. R. Kennedy has been appointed purchasing agent of the Fort Smith Light & Traction Company, Fort Smith, Ark., to succeed W. J. Parker.

L. M. Stevenson has been appointed master mechanic of the Alaska Gas-tineau Mining Company, Thane, Alaska, to succeed William G. Carlberg.

H. A. Nevans has retired as auditor of the Aurora, Elgin & Chicago Railroad, Aurora, Ill., to accept a position with an insurance company in Chicago.

David Bruce has resigned as superintendent of the Lawrence division of the Bay State Street Railway, Boston, Mass. He has been succeeded by John H. Hayes.

Milton G. Potts, formerly treasurer and general manager of the Lykens

Valley Traction Company, Williams-town, Pa., is dead. He was seventy-three years old.

A. Patterson has been appointed electrical engineer and engineer of overhead construction of the Southwestern Gas & Electric Company, Texarkana, Ark., to succeed George O. Bernard.

John H. Hayes, who has been superintendent of the Hyde Park division of the Bay State Street Railway, Boston, Mass., has been appointed superintendent of the Lawrence division of the company.

Henry F. Atherton, Albany, N. Y., has been appointed assistant general manager of the Hudson Valley Railway, with office at Glens Falls, N. Y. Mr. Atherton has been treasurer of the United Traction Company, Albany, and



H. F. ATHERTON

Hudson Valley Railway for the last five years and his new appointment is a well deserved and earned promotion. Mr. Atherton will be in charge of the company's passenger and freight schedules, thus relieving A. E. Reynolds, general manager, of the details of operation.

George A. Fernald, Boston, Mass., has been elected president of the Nashua (N. H.) Street Railway, operated under lease by the Bay State Street Railway. Mr. Fernald succeeds John A. Fisher, resigned.

Ray W. Reynolds, general manager of the Mesaba Railway, Virginia, Minn., has been commissioned a captain in the army engineering corps and has been ordered to report at Fort Lee, Petersburg, Va. Mr. Reynolds was formerly superintendent of the Hartford & Springfield Street Railway, Warehouse Point, Conn., and was also connected with the Springfield (Mass.) Street Railway.

H. S. Newton, who has been general manager of the Ohio Valley Electric Railway, Huntington, W. Va., for sev-

eral years, will on Feb. 15 become manager of railways for the Monongahela Valley Traction Company, Fairmont, W. Va.

John C. Stone, who has been assistant traffic manager of the Northern Electric Railway, Sacramento, Cal., for the last four years, has been appointed traffic manager of the Central California Traction Company, Stockton, Cal. effective March 1.

R. D. Voshall, superintendent of equipment of the Birmingham Railway, Light & Power Company, Birmingham, Ala., has also been appointed master mechanic of the Birmingham-Tidewater Railway, which the Birmingham Railway, Light & Power Company controls, to succeed J. L. Mason.

E. W. Rice, Jr., president of the General Electric Company, and Gerard Swope, vice-president of the Western Electric Company, who have been visiting Japan, after extended tours in Eastern Asia, investigating industrial fields for electric plants, have been decorated by the Emperor of Japan.

G. B. Treat, assistant general manager and chief engineer of the Oklahoma Railway, Oklahoma City, Okla., has been appointed consulting engineer of the United States Fuel Administration for the State of Oklahoma. The appointment was made by P. A. Norris, Federal Fuel Administrator for Oklahoma.

O. A. Smith has been appointed general passenger agent of the Pacific Electric Railway, Los Angeles, Cal., succeeding to part of the duties per-



O. A. SMITH

formed previously by D. W. Pontius, now general manager of the San Diego & Arizona Railroad. Mr. Smith was formerly assistant to Mr. Pontius in the passenger department. He is thirty-two years old. He became connected with the Pacific Electric Railway nine years ago, going to that company from the Missouri, Kansas & Texas Railroad.

Fred M. Smith, Dixon, Ill., who has for several years been in charge of the safety work of the Illinois Northern Utilities Company and has in this way been rather closely connected with the bu-

reau of safety of the Middle West Utilities Company, Chicago, Ill., has become connected with the bureau as one of its representatives.

Eugene C. Clarke has received the title of superintendent of instruction and efficiency of the Tacoma Railway & Power Company and the Pacific Traction Company, Tacoma, Wash. In November last Mr. Clarke resigned as supervisor of instruction of the Brooklyn (N. Y.) Rapid Transit Company to direct the instruction of trainmen and to handle general efficiency work for the companies at Tacoma. A portrait and a biography of him were published in the *ELECTRIC RAILWAY JOURNAL* of Dec. 1, 1917.

N. W. Smith, general counsel of the Rhode Island Company, Providence, R. I., from about the time the New York, New Haven & Hartford Railroad took over the electric railways in Rhode Island until the Rhode Island Company was separated from the New Haven Railroad by the federal decree in the dissolution suit, has been made general attorney for the New Haven Railroad, with offices at New Haven, Conn. Mr. Smith was born at Providence on Nov. 18, 1873. He was graduated from Yale in 1896 and later from the New York Law School. In 1899 he became junior partner in the firm of Edwards & Angell, Providence, and in 1904 was appointed assistant attorney for the New Haven Railroad for Rhode Island.

I. L. Ward, formerly with the Southern Pacific Company in San Francisco, was recently appointed purchasing agent for the Pacific Electric Railway,



I. L. WARD

Los Angeles, Cal. He succeeded F. W. Taylor, who left the Pacific Electric to become purchasing agent of the Southern Pacific's System in the territory from El Paso to Portland. Mr. Ward is thoroughly familiar with railroad purchasing. By taking over the Pacific Electric purchases Mr. Ward becomes practically the largest purchaser of materials in southern California. Mr. Ward was for nine years with the Chicago, Rock Island & Pacific Railway in the maintenance of way, mechanical and store departments. For the last eight years he has been with

the Southern Pacific, serving first as chief clerk to the general storekeeper, as storekeeper, general stores, and chief clerk of the purchasing department.

James F. Hamilton, general manager of the New York State Railways, Rochester Lines, on Feb. 8 was made vice-president of the entire system of the New York State Railways, including the properties at Rochester, Syracuse and Utica. Mr. Hamilton will at once assume the entire management of the properties, with headquarters at Rochester, the several local managers reporting directly to him. Mr. Hamilton began his railroad career in 1897 as a conductor on the lines of the International Railway at Buffalo, and after various promotions with that company, he resigned in 1902 to accept a position as assistant superintendent of the Schenectady Railway and was promoted to the position of superintendent in 1909. Mr. Hamilton was appointed in 1911 general superintendent of the United Traction Company, Albany, and was retained by the Schen-



J. F. HAMILTON

ectady Railway in an advisory capacity. In 1912 he was promoted to the office of general manager in charge of both the Schenectady Railway and United Traction properties. He resigned from these positions to assume the duties of general manager of the New York State Railways, Rochester Lines.

W. P. Power, who has been general manager of the light, heat and power interests of the Ohio Valley Electric Railway, Huntington, W. Va., has in addition been made general manager of railways of the company to succeed H. S. Newton, appointed to the Monongahela Valley Traction Company, Fairmont, W. Va.

Samuel Insull, Chicago, has resigned as president of the West Penn Railways and the West Penn Power Company, Pittsburgh, Pa., because of inability to devote the time necessary to the duties of that office with the companies. Mr. Insull has been re-elected a director. Mr. Insull became president of the companies several years ago.

A. E. Reynolds, who has been acting general manager of the United Traction Company, Albany, N. Y., has been made general manager of the company. Mr. Reynolds began his electric railway career in the city of Plattsburgh, N. Y., in 1896, with Sanderson & Porter, New York, the principal owners and operators of the Plattsburgh Traction Company. He continued with that company from the time of its purchase by the Delaware & Hudson Company in 1907 until June 1, 1909, when he was transferred to Glens Falls, N. Y.,



A. E. REYNOLDS

as general manager of the Hudson Valley Railway. Under Mr. Reynolds' management the physical condition of the Hudson Valley Railway was greatly improved and the property is at present considered one of the best interurban lines in the State of New York. On Oct. 1, 1917, upon the resignation of Charles F. Hewitt as general manager of the United Traction Company Mr. Reynolds was appointed acting general manager and continued as such until Feb. 1 when announcement was made of change in title to general manager. Mr. Reynolds remains as general manager of the Hudson Valley Railway, Albany. With these important systems Mr. Reynolds has under his operation the lines in Albany, N. Y., Cohoes, Waterford, Mechanicsville, Saratoga, Ballston, Glens Falls, Lake George and Warrensburg, a combined trackage of considerably more than 250 miles. Mr. Reynolds has won for himself a firm place in public opinion at Glens Falls as witnessed by the following comment from the *Post-Star*: "If Mr. Reynolds maintains the same interest in matters of public weal for Troy and Albany that he has always shown in Glens Falls, those cities will gain a prominent and energetic worker for all civic undertakings. If he continues the same co-operation with Troy and Albany newspapers that he has always shown in Glens Falls, the readers of those papers will gain a better knowledge of the railway and be brought to a better realization of the company's efforts to give good service." Mr. Reynolds will direct the operation of both companies from Albany.

C. E. Bennett will be assistant to Charles G. Adsit, consulting engineer of the Georgia Railway & Power Company, Atlanta, Ga., after Feb. 15. Mr. Bennett has been associated with Curtis A. Mees, consulting engineer, Charlotte, N. C., since last summer. In the summer of 1915 Mr. Bennett resigned as electrical engineer with the Northern Contracting Company and the Georgia Railway & Power Company to become associated with Hugh L. Thompson, consulting engineer, Waterbury, Conn. Prior to that time he was electrical engineer with L. B. Stillwell, New York City, and later with Charles O. Lenz, New York City. He was also connected with J. G. White & Company, New York City.

Obituary

George T. Bergen, who twenty years ago and for some years thereafter was general purchasing agent of the Chicago (Ill.) City Railway, is dead. Mr. Bergen attended many of the early conventions of the American Electric Railway Association. He retired from the electric railway field about ten years ago, but had recently been in steam railroad work.

John H. Ruhlman, Youngstown, Ohio, interested in the building of interurban railways, died on Jan. 31 of pneumonia. He was active in the building of the Youngstown & Southern Railway between Youngstown and Columbiana and for several years had been working for the construction of the Lake Erie & Youngstown Railroad, which was to connect Youngstown with Lake Erie at Conneaut.

James D. McDonel, secretary, treasurer and general manager of the Fostoria & Fremont Railway, Fostoria, Ohio, is dead. Mr. McDonel was a store owner in Fostoria and was also engaged in the real estate business in that city in association with his brother. He was injured more than seven years ago during the construction of the railway and is said never to have recovered fully from the hurt which he sustained at that time.

Frank Curtis, a pioneer in city railway operation in New York and formerly president of the Sixth Avenue Railway, now included in the system of the New York Railways, died on Feb. 4. Mr. Curtis was born in Sheffield, Mass., in 1839. At the age of twenty-five he identified himself with the Belt Line Railroad in New York and soon thereafter was elected president of the company. In 1884 he was made president of the Sixth Avenue Railway and finally negotiated the lease of its property to the Metropolitan Street Railway, the predecessor of the New York Railways. Besides his activities in railway enterprises, Mr. Curtis was prominently identified with various financial institutions in New York.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Recent Incorporation

***Empire Railroad, Sylacauga, Ala.**—Incorporated to construct a line from Sylacauga to Marble Valley, 15 miles. Officers: W. C. Lancaster, president; W. L. Legg, vice-president and W. J. Rowland, secretary.

Franchises

Kansas City, Mo.—The Board of Park Commissioners of Kansas City has granted permission to the Kansas City Railways to build a loop at the end of the Marlborough line at Seventh-ninth Street and the Paseo.

East Cleveland, Ohio.—Officials of East Cleveland are preparing a new franchise for the Cleveland Railway. The fare between Cleveland and East Cleveland will be 5 cents and within the boundaries of East Cleveland 3 cents.

Marion, Ohio.—The Columbus, Delaware & Marion Electric Company has asked the City Council for a twenty-five-year franchise for the operation of its street railway and light plant. It has been announced that \$1,000,000 will be spent at Marion in power plant and track improvements.

Track and Roadway

Pacific Electric Railway, Los Angeles, Cal.—Application has been filed with the Railroad Commission of California by the Pacific Electric Railway for authority to abandon and remove its line serving the Arcadia race track.

Southern Traction Company of Illinois, East St. Louis, Ill.—Plans are being made by Senator A. E. L. Gardner of Clayton, Mo., to reorganize the defunct Southern Traction Company of Illinois, which at one time operated an electric interurban line from the present east approach of the Municipal Free Bridge to Belleville. The plan is to repair the road and operate it by electricity as a freight line. Coal is the principal article it is proposed to carry. Mr. Gardner will soon go to Washington to confer with Director General of Railroads McAdoo on the proposition. Mr. McAdoo will be asked to sanction the company's use of the Free Bridge so that coal hauled by the company may not be delayed on the east side of the river.

***Geneva Lake, Sycamore & Southern Railway, Sycamore, Ill.**—This company has been organized with a capital stock of \$150,000 to construct an electric line from the southern shore of Lake Geneva, Wis., through McHenry, DeKalb, Kendall and LaSalle Counties, Ill. The head office will be at Sycamore, Ill.

***New Haven, Ind.**—Plans are being made by a large number of New Haven people for the construction of an electric line to connect New Haven and Fort Wayne. A number of residents have pledged to donate a right-of-way. It is reported that plans are under way to meet with the stockholders of the Fort Wayne & Northern Indiana Traction Company in regard to the new line, as it may be possible some plans may be made to interest this company.

Cheboygan Electric Light & Power Company, Cheboygan, Mich.—The project of building an electric line between Cheboygan and Petoskey through the northern resort section has been abandoned. The Cheboygan Electric Light & Power Company, which received a franchise from the city of Cheboygan, paid over to the city the sum of \$5,000 for failure to construct the road, stating that present conditions do not warrant starting operations. [May 31, '13.]

***St. Louis, Mo.**—In a communication addressed to the Board of Aldermen, the Lindenwood Improvement Association asked that the city of St. Louis build and operate a municipal electric railway from the end of the Tower Grove line of the United Railways to Lindenwood.

Public Service Railway, Newark, N. J.—An extension from the Lackawanna Station to Port Newark terminal has been placed in operation by the Public Service Railway. The new line touches the Lackawanna station, Hudson & Manhattan tubes, Public Service terminal and the Ferry Street station of the Central Railroad.

New Jersey & Pennsylvania Traction Company, Trenton, N. J.—This company has complied with the order of the City Commission and has removed its feed wires along Calhoun Street and Pennington Avenue. The wires had never been used, the company at one time contemplating the extension of its lines on the two thoroughfares.

Brooklyn (N. Y.) Rapid Transit Company.—The work of third-tracking the Myrtle Avenue elevated railroad line between Myrtle Avenue and the Ridgewood depot, Borough of Queens, is rapidly nearing completion. The completion of this work will do much toward relieving the transit grievance of upper Ridgewood, for, with the express service once in operation between Ridgewood and the Williamsburg Bridge, considerable time will be saved

over the present system. From Ridgewood to Chambers Street in twenty minutes will be possible under the new scheme, which will include express service on the third track between the Wyckoff Avenue and the Marcy Avenue stations, at the Williamsburg Bridge approach, continuing under local service across the bridge and thence through the tube to the Municipal Building.

New York (N. Y.) Railways.—Chairman Straus of the Public Service Commission for the First District of New York, has written to Mayor Hylan asking him to initiate proceedings for a relocation of the surface railroad tracks in Central Park West. Under the law the commission can only act in the matter on a complaint by the city authorities, and a complaint made by the last city administration failed because it was defective. One suggestion made was that the northbound track should be placed to the west of the present southbound track, thus leaving space on each side of the track for vehicles.

Pennsylvania Railroad, New York, N. Y.—It is reported that the application of the Pennsylvania Railroad and Lackawanna Railroad to serve the Niagara frontier from Buffalo by acquiring the property and right-of-way of the Frontier Electric Railway, is to be granted. The Pennsylvania and Lackawanna railroads, in return for getting permission to operate through this territory are to build an elevated line through the Tonawandas and the International Railway, whose new Falls line parallels the Frontier Electric Railway's right-of-way, is to extend its embankments as far as the north city line of North Tonawanda. The decision to permit the Pennsylvania and Lackawanna railroads to enter this territory will come shortly from the Public Service Commission for the Second District of New York to which application was made nearly two years ago for permission to operate the Frontier Electric Railway line.

***Rochester, N. Y.**—The city of Rochester is having preliminary plans prepared by F. L. Raschig, Cincinnati, Ohio, for the construction of an 8-mile electric railway through the old bed of the Erie Canal to cost about \$3,000,000.

***Chillicothe, Ohio.**—Bids will be received at the office of the City Clerk of Chillicothe until Feb. 16 for the construction of an electric railway on Paint Street from Second Street to Riverside Street, on Water Street from North Walnut Street to the abandoned Ohio Canal, through City Park from Riverside Street to the right-of-way of the Baltimore & Ohio Railroad.

Windsor (Ont.) Street Railway.—The Ontario Railway Board has ordered the Windsor Street Railway to provide a two-way service on the West Side. It is estimated that the improvement will cost about \$100,000.

Lewistown & Reedsville Electric Railway, Lewistown, Pa.—Notice has been filed with the Public Service Commission of Pennsylvania by the Lewistown &

Reedsville Electric Railway of the issuance of bonds for \$68,000 to provide for extensions and improvements.

Grand Trunk Railway, Montreal, Que.—It is reported that construction has been begun of an extension from the main line of the Grand Trunk Railway to the Military Hospital at Whitby, Ont. It is stated that this line will be electrified and will ultimately form a part of the electric lines to be built under the plans of the Hydro Electric Power Commission of Ontario.

Montreal (Que.) Tramways.—Under the terms of the new thirty-five year franchise, the Montreal Tramways is ordered to build double tracks on about 13 miles of new line. Work is to be begun in June and completed by November.

Dallas (Tex.) Railways.—Officials of Dallas are working out plans which will soon be placed before M. N. Baker, Supervisor of Public Utilities, and officials of the Dallas Railways for approval, looking to the removal of all street car tracks on Main Street from Preston to Lamar. It is the plan to improve Main Street and make a thoroughfare for automobiles and light vehicles. There are now double tracks on Commerce and Elm Streets, running parallel to Main Street and one block on either side, and it is claimed that the street cars that now use the tracks on Main Street could be re-routed so as to use these tracks. The Dallas Railways has already set aside a sum from the budget to be used in rebuilding the Main Street line and it is the plan of the City Commission to permit the company to use this money for other improvements.

Houston, Richmond & Western Traction Company, Houston, Tex.—A report from H. C. McMahon, secretary of the Houston, Richmond & Western Traction Company, states that construction of its proposed line will be begun in about sixty or ninety days. The line will consist of 196 miles of single track and will connect Houston, Richmond, Rosenberg, Garwood, Gonzales, New Berlin, San Antonio and other smaller towns. It is also proposed to extend East as far as Orange. The line will serve the exposition grounds at Houston and possibly one park near San Antonio. The power station will be located at Gonzales and the main repair shops at Houston. [June 16, '17.]

Puget Sound Traction, Light & Power Company, Seattle, Wash.—A. L. Kempster, manager of the Puget Sound Traction, Light & Power Company, Seattle, states that within three weeks the West Street car approach to the high level bridge across the West Waterway near Spokane Street will be completed, and street cars will begin operation over the new structure. The new bridge will be provided with double trackage, and will replace the low level bridge nearby, which has occasioned much transportation delay because of the fact that a scow could not be taken up the Duwamish Waterway without the opening of the bridge.

Shops and Buildings

International Railway, Buffalo, N. Y.—Notice has been served upon the International Railway that it must stop work on the reconstruction of its Forest Avenue carhouse until the city determines whether or not the walls of the old structure encroach 7 ft. upon city property as disclosed by city maps. The company was also warned that it started to rebuild the burned structure without filing plans with the bureau of buildings and without obtaining the permit required by law. The company proposes to spend \$30,000 for the reconstruction of the destroyed carhouse on the old site at Forest Avenue and Tremont Street.

Interborough Rapid Transit Company, New York, N. Y.—The Public Service Commission for the First District of New York has awarded to Walter Farrington, New York, the lowest bidder, at \$217,655, the contract for the construction of station finish for four stations on the new rapid transit lines. These stations are at Whitehall Street, Manhattan, and at Clark Street, Court Street, and Borough Hall, Brooklyn. The station at the latter point adjoins the present Borough Hall station, and, like the Clark Street station, is on a line for operation by the Interborough Rapid Transit Company.

Power Houses and Substations

Pine Bluff (Ark.) Company.—This company is now installing a 2500-kw. General Electric, three-phase, 60-cycle, 2300-volt generating unit in its power station.

Pacific Gas & Electric Company, Sacramento, Cal.—This company plans to extend its transmission lines to Guinda, Rumsey and Brooks.

Wilmington & Philadelphia Traction Company, Wilmington, Del.—Additional boilers are being installed by the Wilmington & Philadelphia Traction Company in its power house.

Albia Light & Power Company, Albia, Iowa.—Work has nearly been completed on the reconstruction of this company's power plant at Albia.

Hagerstown & Frederick Railway, Frederick, Md.—A 6250-kva. turbine is now being installed by the Hagerstown & Frederick Railway at its Security power plant.

Southern Canada Power Company, Montreal, Que.—The Southern Canada Power Company, of which the Sherbrooke Railway & Power Company is a subsidiary, contemplates the erection of about 100 miles of high tension transmission line and has asked for bids on poles, cross arms, insulators, cross arm braces, wire and other material for same.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Car Roofing Manufacturers Report Conditions Quiet

Prices Have Not Been Revised Recently—Shipments Out of Stock, But Deliveries Uncertain

With comparatively little new car construction going on, a majority of the builders having their plants largely devoted to government and war material work, the manufacturers of car roofing or headlining report business quiet. Such sales as have been made to electric railways is for maintenance or replacements. One manufacturer said that while no special changes had recently occurred in prices, the revision followed the metal markets to a very great extent. At any rate, quotations for car roofing material held good on an average of fifteen days for acceptance, but in some instances prices are subject to change without notice. As new rolling stock orders are concededly few and far between at present, trade is far from active, although the call for the material could be properly described as steady. Shipments are promptly made out of stock, and this company is prepared to handle any size order. Deliveries are dependent on the embargoes, which were seriously hampering all lines of business east of Pittsburgh.

A couple of other car roofing manufacturers expressed themselves along similar lines. There had been no change in price, in one instance, within two months. Prompt shipments could be made out of factory stock, but deliveries were subject to embargo restrictions. No business had been lost, however, as every concern in all lines was feeling the inconvenience of the present tangled transportation situation. Slight relief had been afforded during the past week. The railroads propose to try other methods of handling freights, it was observed, but it would doubtless be ten days or more, even with favorable weather, to clear up the congestion along the Atlantic seaboard. This manufacturer was handling government work, but it did not interfere with caring for the needs of the regular trade.

Still another manufacturer stated no change in his price quotations had been made in a year, nor was any contemplated. Shipments could be met promptly from warehouse stock, but the embargoes held up deliveries to the consignee, so that his company was obliged to name figures f.o.b. factory in self-defense, if for nothing else. It is the safest policy for the seller and equitable to the buyer, the company explained. No trouble was experienced in securing raw material.

Window Glass About to Advance

Production Has Been Decreased 75 Per Cent and Wages Increased 25 to 30 Per Cent

Evidently the price of car window glass is on the point of an advance. All window glass manufacturers, pending the placing of an important government order, withdrew their prices on Jan. 1. Since then no prices, according to one of the largest companies in the country, have been quoted either on car or any other kind of window glass, nor are orders accepted but conditionally. It is expected, however, that the waiting of the factories will soon be over, the official requisition allotted among the plants, and the quoting of prices resumed, but on a higher level. Supporting this report is 25 to 30 per cent increase in the wages of skilled glass workers as of the beginning of the present "fire," namely Dec. 8, last. Owing to the fuel order production has been reduced 75 per cent. That some sizes of glass are already off the market is denied, but it seems true that stock in the hands of jobbers is meager.

Laconia Car Company Reorganized

New Officers Elected and a Different Product Decided Upon—Changes Announced

Following the readjustment of the affairs of the Laconia Car Company, Boston, Mass., it is reported that the company will give most of its attention to the building of freight rather than electric cars. This policy will be followed for an indefinite time. Early in December last the following reorganization committee was selected in the interests of the creditors: Clifton H. Dwinnell, chairman, vice-president First National Bank; Herbert K. Hallett, president Fourth Atlantic National Bank; John J. Martin, president Exchange Trust Company; W. J. Bryan, Hunter Illuminated Car Sign Company, and V. C. Bruce Wetmore, Wetmore-Savage Company, all of Boston. Arrangements were made with the creditors, and the committee announced the following policy:

1. To see that the company is operated as economically and efficiently as possible, only authorizing the payment of payrolls and other necessary expenses, and the purchase of such materials and supplies as are necessary to carry out present orders, or may be required for new business which may be taken at a profit.

Revised Rules for Obtaining Federal Priorities

War Industries Board Formulates New Regulations for Determining Precedence

The priorities division of the War Industries Board of the Council of National Defense has made public Priority Circular No. 3, defining the regulations which the priorities division now has in effect for determining precedence in orders and work and describing the methods of administering them. The regulations are subscribed to by the Secretary of War, the Secretary of the Navy, the chairman of the Shipping Board and president of the Emergency Fleet Corporation and the chairman of the Council of National Defense. The circular discloses a much wider field of operations than that defined in the first circular issued in September of last year. The priority regulations apply to all individuals, firms, associations and corporations engaged in the production of copper, iron and steel and in the manufacture of their products; of chemicals, cotton duck and woolen cloth, and all such raw materials and manufactured products as the committee may deem necessary from time to time.

Under the new regulations all orders

and work are divided into four general classes instead of three as heretofore: Class AA, class A, class B, and class C, with such sub-divisions as class AA-1, class AA-2, etc., class A-1, class B-1, etc. Class AA comprises only emergency war work of a special or urgent nature.

The new regulations in no way change or modify any priority orders previously issued. The rule of procedure from now on is that orders and work in class AA shall take precedence of those in all other classes, orders and work in class A preceding those in class B and those in turn orders and work in class C, irrespective of the dates the orders were placed. The committee's work does not cover transportation, and it does not attempt to expedite transportation.

No industry, plant, material or commodity will be classified as such. Only specific orders for materials, commodities or work classified according to their importance in war preparation or in work necessary to the public interest or otherwise of exceptional importance.

2. To see that all creditors are treated alike, and that no preferences are accorded on the indebtedness which has accrued, except that all claims of less than \$1,000 will be paid in full, and that money due from or advanced to the company shall have priority over the notes accepted by creditors.

3. To see that as soon as and as often as possible payments are made on account of the present indebtedness, the same percentage being paid to all.

Changes were made in the executive staff and management of the Laconia company, due to the resignation from the vice-presidency of C. S. Clark, as follows: J. E. Johnson, who, for years has been in charge of the company's Boston office, was appointed vice-president in charge of sales and purchases. C. A. Towle, formerly works manager, became vice-president and general manager, in charge of operation and management.

Well-Known Welding Concern in Merger

Large Metal and Chemical Interests Combine Business Under New Name

Announcement is made that the business of both the Goldschmidt Detinning Company and the Goldschmidt Thermit Company will hereafter be conducted by the "Metal & Thermit Corporation," with general offices at 120 Broadway, New York. These two concerns have been practically combined for the last two years and have occupied joint offices at the above address. The combination, which is controlled exclusively by Americans, has now been put in more permanent form as it is felt that this will tend towards greater efficiency and co-ordination of effort.

The detinning department of the Metal & Thermit Corporation will carry on one of the largest industries of its kind in the world, i.e., the recovering of tin from tin scrap. Approximately 100,000 tons of tin scrap are treated yearly by this department and the recovery approximates the equivalent of 2000 gross tons of metallic tin. The output of this department consists of pig tin, tetrachloride of tin and detinned billets.

The Thermit department will continue the production and sale of Thermit welding materials and apparatus as well as the various carbon-free metals and alloys which are produced by the aluminothermic process. This process was introduced in the United States in 1902. Since then the business has grown very fast, particularly in recent years. In addition to its line of carbon-free metals and alloys, the company produces pure tungsten powder and is also selling agent for the output of a large plant in the Middle West producing 50 per cent electric furnace ferro-silicon.

The Thermit welding process is well known in the electric and steam railroad fields for welding heavy broken parts as well as for welding rail joints in paved streets. In fact, in the railway and steel industry alone more than 1,000,000 lb. of Thermit is used annually.

The Metal & Thermit Corporation operates four different plants, located respectively in Jersey City; Chrome, N. J.; Wyandotte, Mich., and East Chicago, Ind. The Chrome and East Chicago plants are devoted to the detinning industry; the Wyandotte plant to the production of liquid chlorine, and the Jersey City plant to the Thermit products, including welding materials, carbon-free metals and alloys and pure tungsten powder. The corporation operates branch offices and welding shops in Pittsburgh, Chicago, San Francisco and Toronto.

The following are the officers and directors: W. T. Graham, Edgar L. Marston, Daniel G. Reid, F. S. Wheeler, Hubert E. Rogers, F. H. Hirschland, E. L. Ballard, L. A. Welles, Chas. F. Dane, Philip Genheimer and Fred W. Cohen.

Sale of Overhead Material Restricted by Conditions

Price Changes Not Recent—Shipments and Deliveries Are Held Up by Freight Embargoes

With electric railways confining their purchases to immediate requirements, manufacturers, distributors and sales agents of overhead material and accessories do not say business is reflecting any marked degree of activity. More or less buying is mentioned, but apparently to replace either breakages or maintain the equipment at passable if not 100 per cent efficiency. With the placing of a recent order for new rolling stock and extension equipment through the Emergency Fleet Corporation that opened up a vista of promise, the hope was entertained that possibly similar requisitions may come along to supply deficiencies in traction roads furnishing transportation to other shipyards, or large manufacturing enterprises engaged in the production of war material. In this instance the wish was father to the thought which the overhead material man regarded as a part solution of the buyingless capacity of so many electric railway companies in all sections of the country.

Aside from this rather fanciful idea the sale of overhead material is curtailed by natural conditions. The demand for second-hand cars and adaptable equipment is still a factor in the market. Wire manufacturers and distributors, while having the full capacity of their plants engaged, declare the government is taking the greater portion of the output. Their sales of bare wire—waterproof, rubber covered and cable—to the electric roads is on a low level, and they figure only as maintenance and replacements. Prices are the same and deliveries have not improved.

A manufacturer of wire and cable connections informed the *ELECTRIC RAILWAY JOURNAL* that the demand for the past year was unusually heavy, a great part of which was for central station work, due to unusual expansion to meet extraordinary industrial needs. Three-quarters of the company's facilities were devoted to government requirements. No change had been made in the price in a year, so far as these particular products were affected. Shipments were met promptly; that, is, three or four weeks back, but deliveries was another question, in which the embargoes controlled.

Poles and line material had been subject to no late changes, respecting either price or deliveries. A distributor with many connections and a wide

field of operations which handles quantities of wire related as an illustration of the obstacles encountered in making deliveries a late occurrence, where a Connecticut manufacturer had a shipment of 600 lbs. of wire going to a Pennsylvania customer. The railroad refused to accept but 500 lbs. and the shipper was compelled to cut the lot in two so the goods would comply with what seemed an arbitrary regulation and go forward.

Cross-arms and other line material also remained unchanged in price. Everything had been frozen up and it was difficult to get shipments of goods through. Line wiring devices were likewise in the same position. With the arrival of more favorable weather possibly conditions would greatly improve. A manufacturer of line splicers stated that, from his own experience and what he learned from others making these specialties, there was no great demand just at present. There were no price revisions, and deliveries depended materially upon the strictures of embargoes and who the buyer was.

Glass insulators are spoken of as in none too ample supply. Prices have been moving upward steadily from time to time, the last of 15 per cent jump being sent out about the first of the year. One of the manufacturers declined to be quoted on the situation. He admitted his works were in about the same place as other manufacturers so far as fuel and labor were considered, and he was simply awaiting developments. Line men's tools, or devices or kits are not selling any more freely than for some time past.

Date Your Catalogs

American Chamber of Commerce, Paris, France, desires to bring to the attention of American manufacturers who are sending copies of their catalogs to France the advisability of printing on such catalogs the date of their issuance. While catalogs sent to chambers of commerce and consulates are stamped with the date of their receipt and therefore an approximation of when they were issued is possible, if a business house or other recipient does not so stamp an incoming catalog there is a great chance of confusion of dates, with consequent misunderstandings between the foreign buyer and the American seller as to price, patterns, etc.

Rolling Stock

Toronto & York Radial Railway, Toronto, Ont., Can., lost six interurban cars on Feb. 5 in a fire which destroyed the company's Metropolitan division carhouse.

International Railway, Buffalo, N. Y., had four cars destroyed by fire on Feb. 6. Three of the cars caught fire in the Cold Spring barns at Main Street and Michigan Avenue and were burned, with a loss estimated at \$15,000, and the fourth car caught fire while being operated in Hertel Avenue and was destroyed with a loss estimated at \$4,500. These four cars are in addition to the forty-eight cars recently lost in the destruction of the Forest Avenue carhouse.

Southern Public Utilities Company, Charlotte, N. C., it is reported, has purchased two second-hand cars from the Waycross Street & Suburban Railway, Waycross, Ga., which will be converted into the one-man type. The work is being done in the company's shops at North Anderson, S. C.

Illinois Traction System, Peoria, Ill., is reported to have ordered sixteen electric locomotives for handling freight trains exclusively. The engines are said to be of a new type, far heavier and more powerful than those now in use, which draw from twenty to thirty cars. Mention was made in the *ELECTRIC RAILWAY JOURNAL* of June 2, 1917, of the traction company ordering six locomotives. The company's freight traffic has been growing rapidly.

Trade Notes

Crocker-Wheeler Company, Ampere, N. J., announces that Ben D. Christian and D. B. Graze will hereafter represent it on the selling staff at Cleveland, Ohio, succeeding Howard Dingle and W. W. Clark.

Standard Electric & Elevator Company, Inc., Baltimore, Md., has been re-organized and is offering \$100,000 of 7 per cent accumulative preference stock for public subscription. The money realized through this stock issue

is to be applied to the development of the company's physical facilities necessary to present demands.

W. G. Arthur Reid has been appointed general manager of the Bryan-Marsh branch of the National Lamp Works of the General Electric Company, centering at Detroit, Mich. This will be a separate division.

Burton French, who has been associated with the Insull organizations in Chicago for the last eighteen years, has opened an office at 492 Continental and Commercial National Bank Building, as a consulting engineer, to engage in the preparation of appraisals, examinations, investigations and reports upon public utility properties for financing and operation.

New York Municipal Railway Corporation, Brooklyn, N. Y., has installed twenty Johnson fare boxes on its subway system, and ten more have been ordered from the National Railway Appliance Company, Eastern agents for the Johnson Fare Box Company, Chicago, Ill.

Boston Insulated Wire & Cable Company, Hamilton, Ont., has been chartered with a capital stock of \$200,000 to manufacture cables, wire, etc. The incorporators are: Benjamin T. Burley of Worcester, Mass.; Harry B. Burley of Brookline, Mass.; Grant W. Arnold of Hamilton and others.

Walter A. Zelnicker Supply Company, St. Louis, Mo., has just established permanent offices at 627 Plymouth Building, Minneapolis, Minn., to serve the north central States and Canadian trade. Richard K. Papin, formerly the St. Louis and Southwest, ern representative of the Davenport Locomotive Works, and for ten years manager of the Zelnicker company's equipment department, is in charge.

Esterline Company, Indianapolis, Ind., announces the appointment of the F. R. Jennings Company, 616 Ford Building, Detroit, Mich., as its sales representative for graphic instruments for Michigan. Mr. Jennings will handle that entire State for the Esterline Company, with the exception of the northern peninsula, which is taken care of by the Milwaukee office.

Electrical Engineers' Equipment Company, Chicago, Ill., announces the

removal of its general offices and a portion of the manufacturing departments to 710-714 West Madison Street. This new location is directly opposite the company's present quarters at 711-715 West Meridian Street. The major portion of the factory proper, together with the shipping and stock departments, will remain at the latter address, which is connected to the Madison Street building by means of a runway.

New Advertising Literature

Automatic Ventilator Company, New York, N. Y.: Calendar with European war map to date, flags of the ally nations in correct colors and illustrations of the company's chief products.

Roller-Smith Company, New York, N. Y.: Bulletin No. 500 covering "Enclosed Type Plain No-Voltage Circuit Breakers," the particular application of which is therein described, with accompanying illustrations.

Browning Company, Cleveland, Ohio: Illustrated pamphlet—a fine example of typography—entitled "Browning Buckets"—the "buckets that bite." It is claimed there is no operating condition with which they are not thoroughly familiar.

Baldwin Locomotive Works, Philadelphia, Pa.: The company is distributing record No. 88, descriptive of their Santa Fe type locomotives. They have also prepared record No. 89, descriptive of the development of the eight-driving-wheel locomotive.

Ohio Brass Company, Mansfield, Ohio: Illustrated cardboard folder entitled "Basing Selections on Conditions," describing the company's line of Crouse-Hinds' Imperial headlights—Incandescent, luminous (electrode) arcs and carbon arcs—for which it is general sales agent.

National Lamp Works of General Electric Company: Bulletin entitled "Fundamentals of Illumination Design," which the engineering department of the company has presented, in simple and readable language, a discussion of the broad principles which underlie illuminating engineering practice.

RAILWAY MATERIALS

	Feb. 6	Feb. 30
Rubber-covered wire base, New York, cents per lb.	30-32	30
Wire, weatherproof (100 lb. lots) cents per lb., New York	28 3/4-34 1/4	28 1/4-34 1/4
Wire, weatherproof (100 lb. lots), cents per lb., Chicago	38.35	33 1/2-38.35
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.31	\$1.31
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.32	\$1.32
White lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	49	48 1/2

NEW YORK METAL MARKET PRICES

	Feb. 6	Feb. 13
Copper, ingots, cents per lb.	23 1/2	23 1/2
Copper wire base, cents per lb.	27	27
Lead, cents per lb.	7	7
Nickel, cents per lb.	50	50
Spelter, cents per lb.	7.87 1/2	8
Tin, Straits, cents per lb.	*\$5.00	*\$5.00
Aluminum, 98 to 99 per cent, cents per lb.	34-36	34-36

OLD METAL PRICES—NEW YORK

	Feb. 6	Feb. 13
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19 1/2	19 1/2
Red brass, cents per lb.	17 1/2	17 1/2
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	5 1/2	6
Zinc, cents per lb.	5 1/2	5 1/2
Steel car axles, Chicago, per net ton	\$42.42	\$42.42
Old carwheels, Chicago, per gross ton	\$30.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00



The Bay State Appreciates the Peacock

Few companies have to meet such a variety of operating conditions as the 1000 mile system of the Bay State Street Railway, namely—

Small town service; big city service; open highway service; and fast interurban service.

For such variety the Bay State Street Railway sought a brake which combined ADAPTABILITY with RELIABILITY.

So it picked the PEACOCK.

And upon investigation you'll do it too.



National Brake Co.
Buffalo, N. Y.

Bankers and Engineers



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Industrial Plants and Buildings, Steam Power Stations,
Water Power Developments, Substations, Gas Plants,
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Purchase, Finance, Construct and Operate Electric Light,
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Examination and reports. Utility Securities Bought and Sold.

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WORCESTER POLYTECHNIC INSTITUTE
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Analytical Studies of financial and operating conditions,
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all public utility properties

BOSTON, 14 Kilby Street CHICAGO, Conway Bldg.

THE SEARCHLIGHT SECTION

will find { The man
The position } you want
The plant

PUT YOUR AD IN THE SEARCHLIGHT

When writing the advertiser for information or prices, a men-
tion of the Electric Railway Journal would be appreciated.

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and
Mechanical Testing.

80th Street and East End Ave., New York, N. Y.

THE P. EDW. WISCH SERVICE

Suite 1710 DETECTIVES Suite 715
Park Row Bldg., New York Board of Trade Bldg., Boston

Scofield Engineering Co. Consulting Engineers

POWER STATIONS PHILADELPHIA, PA.
HYDRAULIC DEVELOPMENTS GAS WORKS
ELECTRIC RAILWAYS



Columbia Brake Lever Jaws



When you think of safe breaking, don't forget how much depends upon the brake-rigging; and that the brake-lever jaws constitute the most ticklish part of said brake-rigging.

As in the manufacture of other Columbia parts, we use the most modern methods and machinery. You can see for yourself the Bradley 200-lb. hammer that is forging a Columbia-made brake-lever jaw.

The following is but a *partial* list of Columbia products. We can make you most anything in wood or metal.



TOOLS

Armature and Axle Straighteners
Armature shaft straighteners
Armature buggies and stands
Babbitting molds
Banding and heading machines
Car hoists
Car Replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

CAR EQUIPMENT

Armature and Axle Bearings
Armature and field coils
Bearings (Axle and Armature)
Brush-holders and brush-holder springs
Brake, door and other Handles
Brake forgings, riggings, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or mall. iron)
Grid resistors
Third-rail shoe beams and accessories
Trolley poles (steel) and wheels

Columbia Machine Works & Malleable Iron Co.

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

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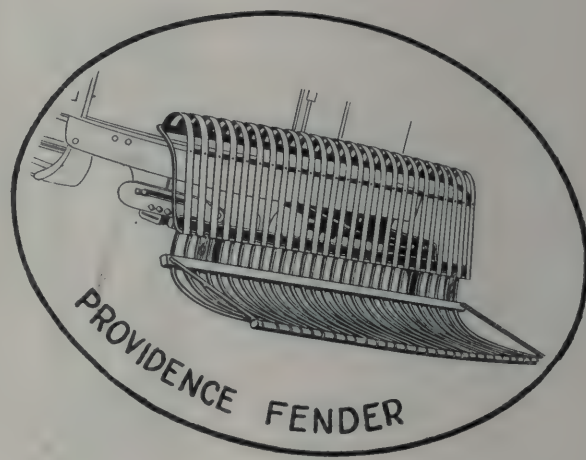
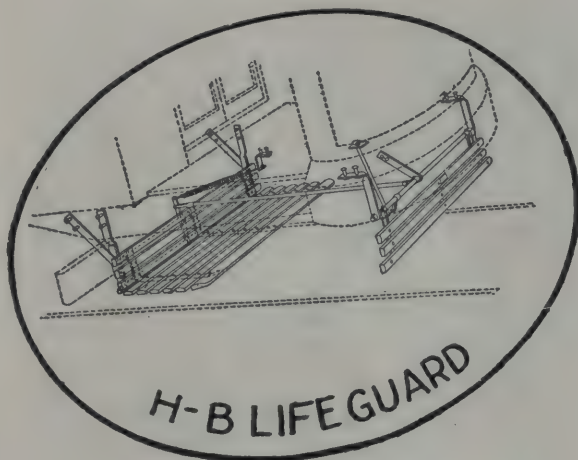
Holden & White, Inc., Chicago

F. F. Bodler, San Francisco

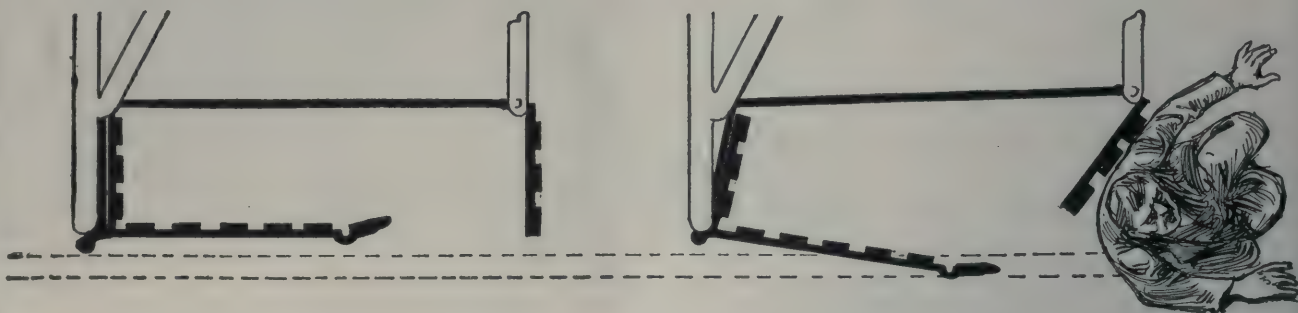
Railway & Power Eng. Corp., Ltd., Toronto, Can.



Let these Pictures



Tell Our Story



Nothing Further Need Be Said

The Consolidated Car Fender Co.
Providence, R. I.

General Sales Agent
Wendell & MacDuffie Co.
61 Broadway, N. Y.



Collier Service *Secures Patrons for Car Advertising*

If you read car advertisements—and who doesn't?—you must have noticed the number of representative national advertisers.

The purchasers of this advertising service did not beg for admission to the street car racks. They had to be *shown* that street car advertising is profitable.

They were not interested in the car card space alone—they were interested in the message Collier Service could put there.

A visit to the art department of Collier Service just to watch an artist produce an effective card is an eye-opener showing how this organization makes car card advertising an asset for its customers, and therefore an assured income to the Railway Company.

Barron G. Collier
INCORPORATED

Candler Building

220 West 42nd Street, New York City

There's but
ONE
Quality

in
**Anderson
Specialties**



ANDERSON Trolley Wheel

And that is—
**THE VERY
BEST**

*Ask for our
Catalog No. 8*

*Copy mailed
on request*



ANDERSON
Cross-Over

ANDERSON
Double Beam

Section
Insulator

Albert & J. M. Anderson Mfg. Co.

289-293 A Street

(Established 1877)

Boston, Mass., U. S. A.

BRANCHES:

New York, 135 Broadway
Chicago, 105 So. Dearborn Street
Philadelphia, 429 Real Estate Trust Bldg.
London, E. C., 48 Milton Street



RIMCO RUBBER INSULATED PLIERS

Protect your employees against high voltage dangers.

The insulation is semi-soft; it will not crack or break when dropped on a hard surface from a pole.

Made of finest tool steel, specially tempered,

with a "handy" grip.

Rimco Rubber Insulated Pliers cost less than ordinary pliers with detachable rubber sleeves. More durable and reliable.

Every pair is guaranteed and tested to 10,000 volts. The *only* pliers so protected.



**The Rubber Insulated
Metals Corporation**

Sole owners of the Elchemco Process for bonding rubber to metals, protected by American and Foreign Patents

Plainfield, N. J.

SALES AGENTS

Electric Service Supplies Co., 17th and Cambria Sts., Philadelphia, Pa.
National Railway Appliance Co., 50 East 42nd St., New York City.
Canadian Distributors: Lyman Tube & Supply Co., Montreal, Toronto and Winnipeg, Canada.



A Sound Investment

Observations and tests, as carried on under ordinary working conditions by progressive roads in all parts of this country and the world, have showed that uneven, corrugated and indented rails have a damaging influence on the life of both the track and the rolling stock, and that money spent in restoring damaged track to its original smooth, level surface is a sound investment.

RECIPROCATING TRACK GRINDER

—originally designed to work under contract, has met with highest approval wherever tested, because it solved the problems which interfered with the use of other grinding equipment.

Write for particulars.

RAILWAY TRACK-WORK COMPANY
30th and Walnut Streets
PHILADELPHIA, U. S. A.

Carry Freight

Go into the new field for street railways—freight and express business. A great many companies are turning to this profitable traffic.

You can find out how the scheme works, what the requirements are, how to introduce the system, and where it is most successful by reading pages 355-357 of

Blake and Jackson's Electric Railway Transportation

487 pages, 6 x 9, illustrated. \$5.00 net, postpaid

This book is a complete manual of modern transportation methods and practice. It aims to stop profit leaks due to faulty transportation practice.

It emphasizes the close relation between efficient transportation methods and financial success.

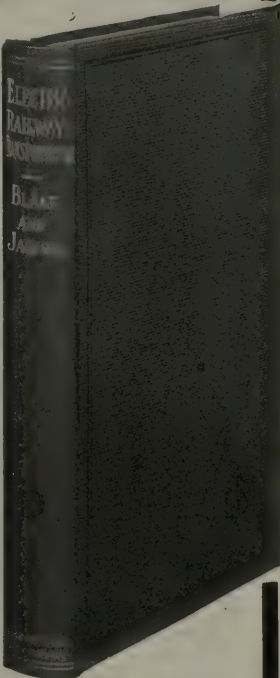
It is the first book to cover the transportation side of the electric railway business.

Read what the book contains:

- I. Organization and Definitions.
- II. Adjustment of Service to Traffic.
- III. Accelerating Traffic Movement along the Line.
- IV. Accelerating Traffic Movement on the Car.
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- VI. City Timetables—Preliminaries.
- VII. Interurban Schedules and Dispatching.
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- X. Public Relations.
- XI. Promotion of Passenger Traffic.
- XII. Traffic Signs for Cars, Station and Road—Information for the Public.
- XIII. Competition.
- XIV. Freight and Express Business.
- XV. Selection and Training of Men.
- XVI. Wages and Wage Agreements.
- XVII. Welfare Work.
- XVIII. Discipline of Trainmen.
- XIX. Forms of Extra Pay.

It will pay you to examine this book. Send no money—just the coupon.

This is a book of such definite value that you will refer to it constantly. It is a book you cannot afford not to read. Examine it for ten days free. No agents—no follow-up.



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McGraw-Hill Book Co., Inc.,
239 West 39th St., New York, N. Y.

You may send me on 10 days' approval:
Blake and Jackson—Electric Railway Transportation, \$5.00 net.

I agree to pay for the book or return it postpaid within 10 days of receipt.

....I am a regular subscriber to the Electric Railway Journal.

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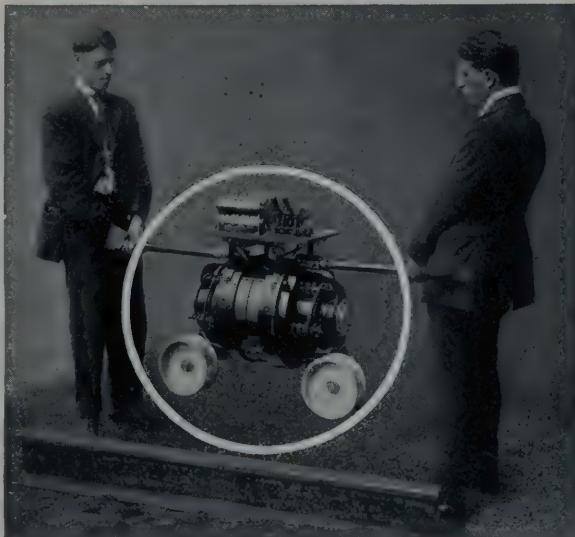
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Lincoln

Bonding

With this light weight electric welder two men can install bonds at the rate of 10 per hour. Any road equipped with a Lincoln bonding machine can rapidly install bonds that will insure a return circuit of maximum conductivity.



System

You can have this welder mounted on a two-wheel cart — ready when and where you want it. No grinding or drilling. The electric arc throws off the scale, rust and dirt, and leaves a clean welding surface.

Try one at our expense. Write us.

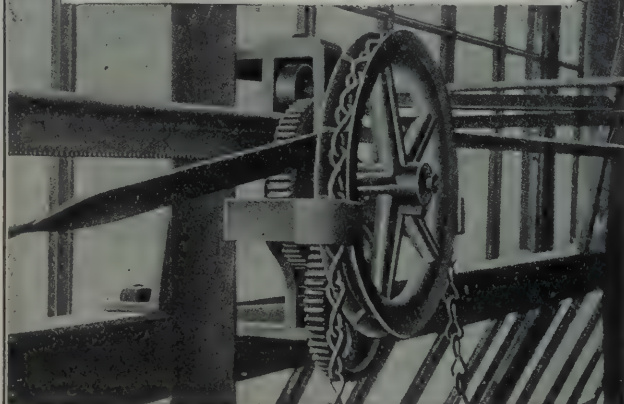
The Lincoln Bonding Co., 636 Huron Road, Cleveland, Ohio

LEWIS & ROTH COMPANY
1012 Liberty Bldg., Philadelphia, Pa.
519 W. 38th St., New York City, N. Y.

AGENTS:
CHARLES N. WOOD CO.
14 Federal St., Boston, Mass.
HOLDEN & WHITE, Inc.
343 S. Dearborn St., Chicago

W. C. BURDICK, Milwaukee, Wis.
808 First National Bank Building
W. H. ELLIOT, Chattanooga, Tenn.

"STRAIGHT-PUSH" (PATENTED) SASH OPERATORS



**They are recommended
where they are used**

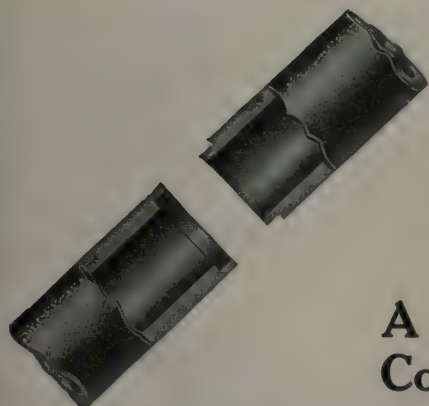
because the strength of this operator in its straight push-and-pull on each sash means an evenly worked sash. Always in order—always usable—always reliable—non-rusting—patented. We stand back of it.

"STRAIGHT-PUSH" (PATENTED) SASH OPERATORS

Here is an operator once used always used. Its greatest advantage is its absolute certainty of operation guaranteed by the patented straight push-and-pull principle of action and its low maintenance. The parts are time and wear proof to an extraordinary degree.

Investigate installations near you.

THE G. DROUVÉ CO.
BRIDGEPORT, CONN.



JOHNS-MANVILLE FIBRE CONDUIT

A hundred feet of Johns-Manville Fibre Conduit can be carried by one man

WHERE speedy installation is a factor, everything is in favor of Johns-Manville Fibre Conduit. Unskilled labor can do all the work. No burlap or special cement is required at the joints. One man can keep the duct-layer supplied, and breakage due to rough handling is practically negligible.

When completed, the duct is a smooth, water-tight tube. Rough walls and cement drippings—the cause of about 90% of all cable trouble—are eliminated. Unaffected by severe sub-soil conditions, and possessing exceptionally dielectric and mechanical strength, Johns-Manville Fibre Conduit meets every service requirement of installation and maintenance economy. Ask for a copy of the construction data booklet.

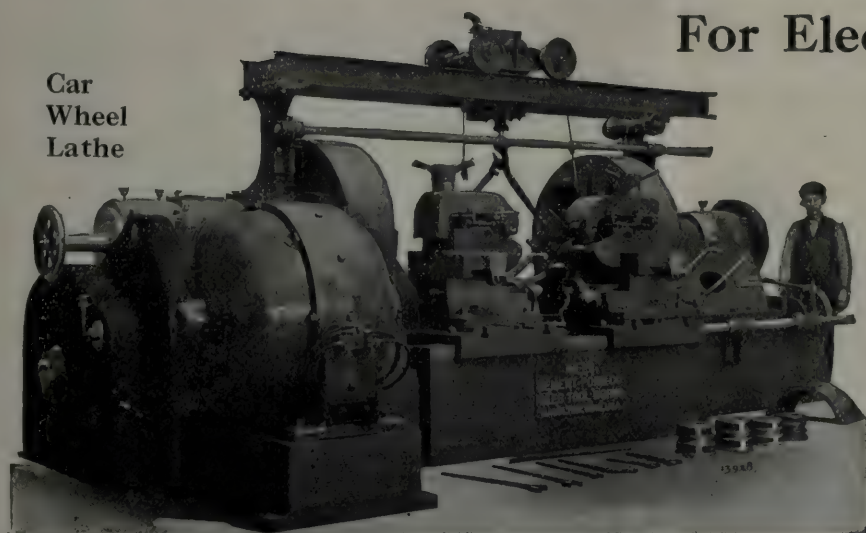


H. W. JOHNS-MANVILLE COMPANY
NEW YORK CITY

10 Factories—Branches in 61 Large Cities

MACHINE TOOLS

**For Electric Railway
Repair Shops**



Car
Wheel
Lathe

WE are in a position to furnish complete machine tool equipment for electric railway repair shops, including steam hammers and electric traveling cranes.

Correspondence Invited.

NILES-BEMENT-POND CO.

GENERAL OFFICES: 111 BROADWAY, NEW YORK

Boston, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Birmingham, Detroit, Chicago, St. Louis, San Francisco

Service Insurance

You insure your cars against fire and other losses; why not protect them against service loss also? Idle cars in the barns undergoing repairs instead of producing transportation earn no revenue.

One form of insurance lies in using

MORE-JONES : ARMATURE : BABBITT METAL

It adds to the productive mileage of each car and saves the cost of frequent rebabbiting besides.

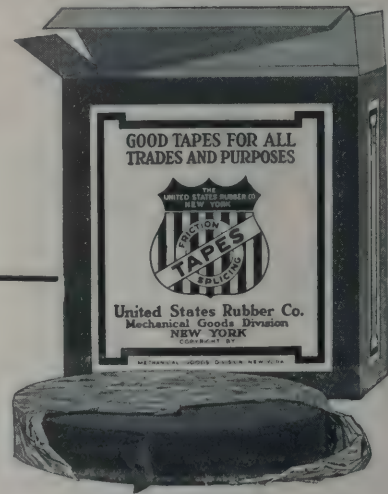
More-Jones Armature Babbitt Metal was originated for armature bearing service exclusively. Scientifically compounded from the purest new metals under chemical and physical laboratory supervision, it flows like quicksilver, never casts a loose box, does not flake or heat and runs true and even. Can be used over and over again without diminishing its efficiency. Recognized the world over for unexcelled quality.

Further
information
and prices on
application



**More-Jones
Brass & Metal Co.**

3134 No. Broadway, St. Louis, U. S. A.



Additional Guarantee

The United States Rubber Company stands back of every one of the sixteen brands of

Friction-Splicing TAPE

with its great seal—an additional guarantee of high quality, value and service. These tapes—sixteen special brands from which to choose for your particular service—are very adhesive and strong. The fabric is closely woven and uniform. The compounds smooth and even.

*No pin holes
or
free sulphur.*

United States Rubber Co.

Mechanical Goods Division

NEW YORK





GRIFFIN F. C. S. WHEELS

embody the results of scientific development, service data, and an engineering investigation.

Our BULLETIN 18 on chilled iron car wheels for street car and interurban service will give you complete data as to patterns, etc.

F. C. S. wheels mean moderate cost, safety, high mileage and brake shoe economy.

All of our foundries are equipped with complete machine shop facilities for pressing wheels on axles.

GRIFFIN WHEEL COMPANY
McCormick Building, Chicago, Ill.

FOUNDRIES

Chicago

Detroit
Los Angeles

Boston
Tacoma

Denver
Kansas City

St. Paul

Step by Step

good qualities are improved and bad eliminated; that is the way in nature and in industry alike. But progress to be sure-footed must start from a good foundation and must proceed by the use of methods taught by experience.

In the case of high duty gears, for instance, the wooden gear has given place to cast iron, the cast iron to cast steel, and the cast steel, in turn, has been succeeded by the heat treated rolled steel gear which represents the most efficiently practicable type of modern gearing and which includes all the merits of its predecessors but none of their demerits.

The gear cutter has built the modern high duty, long service, heat treated gear on a foundation made for him by the steel maker, and the steel maker, in turn, when he furnished the gear cutter the solid rolled steel blank worked into that blank all the skill which comes from long years of experience.

The heat treated solid rolled steel gear cut from a

Carnegie Rolled Gear Blank

is the last word in effective gearing. Users of large size, high duty transmission gearing can well afford to investigate its merits and to profit by the orderly course of its development. It weighs less than any of its predecessors but surpasses them three or four to one in the matter of endurance.

Carnegie Steel Company

General Offices: Pittsburgh, Pa.

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



STANDARD STEEL WORKS CO.

Morris Building, Philadelphia

New York
Chicago
St. Louis
Pittsburgh
San Francisco
Richmond

Portland
Havana, Cuba
London, Eng.
Melbourne, Aust.
Monterey, Mex.
Mexico City.



Would Lose a Million

One of the country's largest advertisers, at present rushed with work and orders for the next 12 months, stated when asked why he advertised regularly in the Trade Press, although unable to fill any orders:

"Nothing in the world is shorter lived than the memory of the buying public. Cut out your advertising and they'll forget you in 6 months.

"I would lose \$1,000,000 in the next five years if I cut out advertising now! And it would cost me another million to convince them I'm still doing business."

**Electric Railway
Journal**

Member Audit Bureau of Circulations

"The Quality Shops"
CARS TRUCKS



Speed

While accuracy of work, durability of materials and quality of exterior finish are essential factors in car construction, the ability to combine speed with them is of still greater importance.

St. Louis Cars, with their life-long reputation for accuracy and reliability, are built in a factory whose size and organization enable it to assure prompt and reliable deliveries.

If you have a problem of any kind pertaining to cars we will gladly co-operate in its solution.

St. Louis Car Company
St. Louis, Mo.

SPECIAL STANDARD BRONZE (S. S. B.)

High Strength Trolley Wire

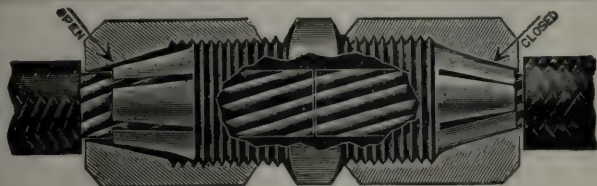
is unexcelled for durability, reliability and economy. Samples and prices on request.

STANDARD UNDERGROUND CABLE CO.

PITTSBURGH, PA.

Branches in all principal cities.

For Canada: Standard Underground Cable Co. of Canada, Limited, Hamilton, Ont.



Makes Splices Easy to Open Up, Too

All you need is a wrench to open up a splice or make it up again, if you use

FRANKEL SOLDERLESS CONNECTORS

Wonderfully simple; Mechanically and electrically strong. Withstand big overloads. Get our booklet.

Factory:

177-179 Hudson
St., New York



Sales Rooms:

1140-1146 Broadway
New York

STEEL POLES For Every Pole Purpose



Bates Steel Poles Ornamenting the Approach to the New Wisconsin State Capitol Building, Madison, Wis.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.

We have constantly on hand about two thousand tons of steel and can make immediate shipments.

A full line of convenient malleable fittings.

Our steel pole *TREATISE* tells a big story. Ask for it.

BATES EXPANDED STEEL TRUSS CO.

208 South La Salle St., Chicago, Ill., U. S. A.

Business not as usual

We have been hearing about
SHIPS—SHIPS—SHIPS
and More Ships

Now Think About It
We cannot get those Ships
without
THE RAILROADS

This War
cannot be won without
The Railroads

THE RAIL JOINT COMPANY

61 Broadway

New York City

ALUMINUM COMPANY OF AMERICA PITTSBURGH, PA.

Manufacturers of Aluminum, Ingot, Sheet,
Tubing, Wire, Rod, Rivets, Moulding,
Extruded Shapes, Electrical Conductors

General Sales Office, 2400 Oliver Building, Pittsburgh Pa.
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New York.....120 Broadway
Philadelphia.....1216-1218 Widener Building
Rochester.....1112 Granite Building
San Francisco.....731 Rialto Building
Washington.....509 Metropolitan Bank Building

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Send inquiries regarding aluminum in any form to nearest Branch Office, or to General Sales Office.

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Masa.

Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates

Turnouts and Cross Connections

Kerwin Portable Crossovers

Balkwill Articulated Cast Manganese Crossings

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AWARDED



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Crown
United States
Twin Terminal
Soldered

American Steel & Wire Company

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Western "Good Poles Quick" Northern

Quick Shipments
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Rooms 832-834, 72 West Adams St., Chicago, Ill.
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Special Attention Given to Traction Insurance

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THESE OFFICES WILL GIVE YOU THE BEST THERE IS IN INSURANCE SERVICE

Michigan

Western

CEDAR POLES POSTS, TIES AND PILING BUTT TREATING

The Valentine-Clark Co.
General Office: Minneapolis, Minn.

Toledo, Ohio; Chicago, Ill.; Kansas City, Mo.; St. Maries, Idaho.

POLES

NORTHERN WHITE CEDAR WESTERN RED CEDAR
BUTT TREATING

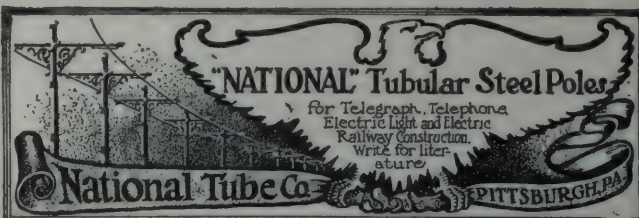
PAGE & HILL CO.

MINNEAPOLIS, MINN.

FEDERAL SIGNAL CO. ALBANY, N. Y.

CONSULT OUR ENGINEERS ON YOUR
SIGNAL REQUIREMENTS

52 Vanderbilt Avenue, New York Monadnock Block, Chicago
118-130 New Montgomery St., San Francisco, Cal.



The Trenton

Three Section Tower Outfits to fit any make of chassis.

Write for literature and prices.

J. R. McCARDELL & CO., Trenton, N. J.

POLES WESTERN CEDAR PILING

We brag about the SERVICE we give

B. J. CARNEY & CO.

E. B. BRANDE, Manager M. P. FLANNERY, Manager
819 Broad Street Grinnell, Ia. Spokane, Wash.
WM. MULLER & CO., 1729 McCormick Bldg., Chicago.
Commit us to memory.

Wire Rope
and Wire
Insulated
WIRES and
CABLES



JOHN A. ROEBLING'S SONS COMPANY, Trenton, N. J.

Aristos "COPPERWELD"—Copper Clad Steel Wire—

Beats Solid Copper 40 Ways

Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs Less to Maintain
GET DATA

Made from the product of Copper Clad Steel Co. of Pittsburgh, Pa.
General Sales Office **PAGE STEEL & WIRE COMPANY** Western Sales Office
Page Steel & Wire Co. Steel Sales Corporation
30 Church St., New York Monessen, Pa. Chicago, Ill.

Chapman Automatic Signals

Charles N. Wood Co., Boston



Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG.

ARCHBOLD-BRADY CO.

Engineers & Contractors SYRACUSE, N. Y.

Peirce Forged Steel Pins with Sheet Steel Thimbles

Your best insurance against insulator breakage

Hubbard & Company

PITTSBURGH, PA.

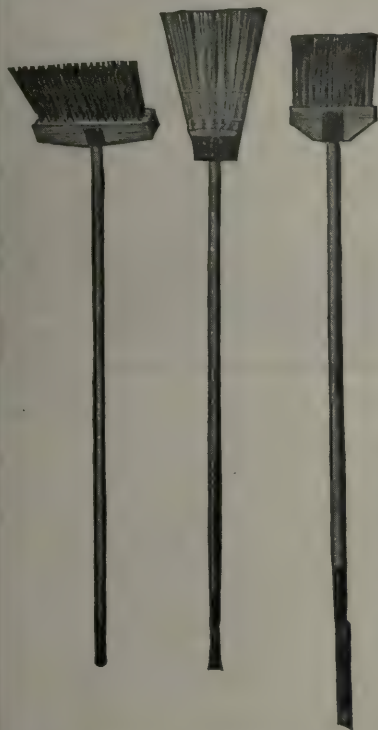
EUREKA PRODUCTS

Commutators, Trolley Wheels, Sleet Trolley Wheels,
Trolley Ears, Line Material, Controller Fingers, Brush
Holders, etc.

We make quality goods.

THE EUREKA COMPANY, North East, Pa.

A Great Combination



No. 1 to sweep crossings.

No. 2 to handle light dirt and snow in the frogs, switches, and curves.

No. 3 to remove ice, slush and mud from the same places and a chisel point on the end of the handle to loosen the ice and crust.

No. 1 and No. 3 contain Flat Steel Tempered Wire, and nothing superior can be produced. Serviceable all the year round. Your road is not complete without them.

Write for Prices.

J. W. PAXSON CO., Mfrs.
1021 N. Delaware Ave., Philadelphia, Pa.



ACME (NESTABLE) CORRUGATED CULVERTS

are splendidly suited for service under the road-bed proper as well as for approaches. Thousands of these culverts are now in use in all parts of the country. Many of them have seen

Ten Years of Service

and are still in good condition. If you're in the least skeptical about either the strength or the lasting qualities of "ACME" Culvert—

Ask Superintendent of Roadways Mitchell of the Union Traction Company of Indiana.

Ask Superintendent Wardle of the Cedar Rapids & Iowa City Railway.

Ask General Manager Hatch of the Northwestern Pennsylvania Railway Company.

Ask Engineer M. of W. Gurley of the Kanawha Traction & Electric Co.

Ask General Manager Warren of the Toledo & Indiana Railway.

Ask—we'll ask us and we'll give you a lot more references—for Traction officials the country over have not been slow to recognize the advantages of prompt shipment, easy transportation and installation, strength and lasting qualities, that are characteristic of "ACME" (Nestable) Culverts. Write for Catalog G-3.

THE CANTON CULVERT & SILO CO.
MANUFACTURERS
CANTON, OHIO, U.S.A.

HIGHEST QUALITY

TRACK SPECIAL WORK



WE MAKE THIS GRADE ONLY

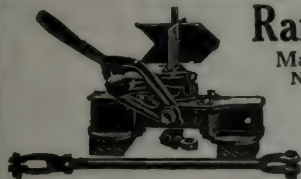
CLEVELAND FROG & CROSSING CO.
CLEVELAND OHIO

SPECIAL TRACK WORK

SWITCHES, FROGS AND CROSSINGS.
ANTI-KICKING BIG HEEL
SWITCHES.



TRACK WORK
OF EVERY DESCRIPTION.
HARD CENTER CONSTRUCTION.
Balkwill Articulated Cast Manganese Crossings
New York Switch & Crossing Co.
Hoboken, N. J.



Ramapo Iron Works

Main Office, Hillburn, N. Y.
New York Office: 30 Church St.

Automatic Switch Stands,
T-Rail Special Work,
Manganese Construction,
Crossings, Switches, Etc.



"WHALEBONE"

Fibre Track Insulation

DIAMOND STATE FIBRE CO.
Elsmere, Del. Bridgeport, Penna. Chicago, Ill.

Kilby Frog & Switch Co.

BIRMINGHAM, ALA.

Tongue Switches, Mates, Frogs, Curves and
Special Work of all kinds for Street Railways

TOOLS

for all classes of electrical construction and repair
work. Write for catalog.

Mathias Klein & Sons Canal Station 25 Chicago

Send for Our New Booklet on the Subject of Water as Used for Steam Making

The subject is one that cannot be dealt with adequately in the limited space of an advertisement.

This booklet explains *the causes of Corrosion, Incrustation, Foaming and other troubles, and offers a scientific solution of these difficulties.* We believe it will make you realize more fully than you do already, how destructive of boilers and boiler efficiency untreated feed waters may be.

We believe a study of the booklet will also convince you that we are capable of dealing with the proposition in the most effective manner, and we hope that you will fill out the card at the back of the booklet and send to us with a gallon sample of your boiler feed supply for our analysis and proposition.

Let us have your address and the booklet will be forwarded at once.

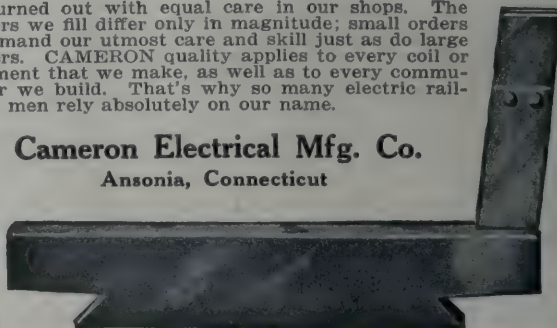
Dearborn Chemical Company

General Offices, 332 South Michigan Ave., Chicago
Laboratory & Factory, 1029-1037 West 35th St., Chicago

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co.
Ansonia, Connecticut



7233

P & B Insulation

guarantees good electrical service. Electric railway men have been buying P & B Products for 34 years—good evidence of quality.



Weatherproof Tape
Insulating Compound
Baking Varnishes
Air-Drying Varnishes
Solid Compounds

Write for Booklets

The Standard Paint Company

Woolworth Building, New York

Boston

Chicago

The Babcock & Wilcox Company

85 Liberty Street, New York

WATER TUBE STEAM BOILERS

Steam Superheaters

Mechanical Stokers

Works: BARBERTON, OHIO—BAYONNE, N. J.

BRANCH OFFICES:

ATLANTA, Candler Building.
BOSTON, 35 Federal St.
CHICAGO, Marquette Building.
CINCINNATI, Traction Building.
CLEVELAND, New England Building.
DENVER, 435 Seventeenth St.

HAVANA, CUBA, Salle de Aguilar 104.
HOUSTON, TEX., Southern Pacific Bldg.
LOS ANGELES, I. N. Van Nuy Bldg.
NEW ORLEANS, 533 Baronne St.
PHILADELPHIA, North American Building.
PITTSBURGH, Farmers' Deposit Bank Bldg.

SALT LAKE CITY, 705-6 Kearns Bldg.
SAN FRANCISCO, Sheldon Bldg.
SAN JUAN, Porto Rico, Royal Bank Bldg.
SEATTLE, Mutual Life Building.
TUCSON, ARIZONA, Santa Rita Hotel Bldg.

Foster Superheaters

Insure uniform superheat at temperature specified

Power Specialty Company

111 Broadway, New York City

WATER SOFTENING OR FILTRATION

FOR BOILER FEED AND ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO.

PITTSBURGH, PA.



CONSERVES energy
and triples the steam-
ing capacity of your
boilers. Write for Cata-
log "C."

MURPHY IRON WORKS
Detroit, Mich. U.S.A.

The MODERN
WAY of handling
ASHES is by the



GECO STEAM JET CONVEYOR

GREEN ENGINEERING CO.

East Chicago, Indiana

Bulletin No. 1 Green Chain Grate Stokers.
Bulletin No. 2 Geco Steam Jet Ash Conveyors.



We specialize in the manufacture of
**High Grade
Motor and
Generator Brushes**
For Railway Equipment

and for all other types of electrical machinery and are in position to make prompt deliveries.

**THE UNITED STATES
GRAPHITE COMPANY**
SAGINAW, MICH.

BRANCH OFFICES:
Philadelphia New York Pittsburgh Atlanta Chicago St. Louis
Denver San Francisco

Full power with
High or Lower Adjustment

Many emergencies requiring a powerful jack present a difficulty in bringing the jack to bear on the load. The

**Buckeye Emergency
Jack No. 239 Special**

saves time, strength and trouble. The many positions to which it is adjustable easily solve perplexing lifting problems. Full details in our catalog. Write for it.

**The Buckeye
Jack Mfg. Co.**
Alliance, Ohio



Hale and Kilburn No. 108

for One-Man Safety Cars
and for heavy city service

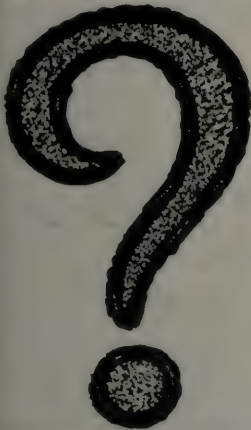
Only four parts—Steel Aisle End Support, Steel Wall End Support, hardwood framed Rattan Cushion, framed Rattan Back. Note new yokeless pedestal.

The
No. 108
is only
One-half
the Weight
of Seats
with Iron
Castings.



Hale and Kilburn Company

Philadelphia New York Chicago - Washington
Atlanta San Francisco Detroit Louisville



Do You Have Costly Commutator Troubles?

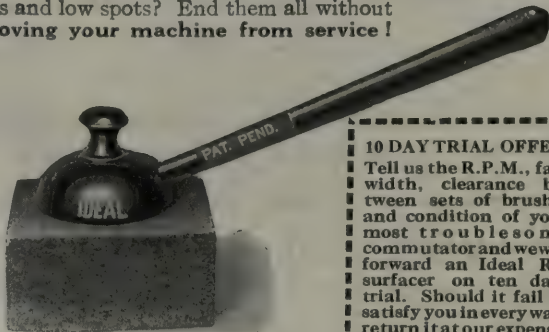
High mica, ridges and high bars, grooves and low spots? End them all without taking down an armature—without removing your machine from service!

The Ideal Resurfacers—

—will enable you to do just this—and is guaranteed. It is a new abrasive composition (non-metallic and non-copper collecting) which cuts down the commutator surface. Does the work with the motor or generator in service carrying load! Made in all sizes, fine and coarse grades. Supplied with handles to facilitate use. Take advantage of our 10-Day Trial Offer today! Decide to permanently remove your commutators from the sick list!

AGENTS will find a highly desirable specialty in the Ideal Resurfacers. In wide demand wherever electrical machinery is used. Write for details of our attractive dealer proposition.

Ideal Commutator Dresser Co.
10 So. Dearborn St., Chicago, U. S. A.



10 DAY TRIAL OFFER.
Tell us the R.P.M., face width, clearance between sets of brushes and condition of your most troublesome commutator and we will forward an Ideal Resurfacers on ten days trial. Should it fail to satisfy you in every way, return it at our expense; if satisfactory, pay for it.

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.
142 Oxford Street, Philadelphia

INSULATING TAPE of Quality



STANDARD
Woven Fabric Co.
Walpole, Mass.

DIXON'S Graphite Brushes

are of uniform texture, free from abrasives and cannot possibly cut a commutator.

Booklet 108-M will interest you.

Made in JERSEY CITY, N. J., by the

JOSEPH DIXON CRUCIBLE COMPANY

Established 1827



"Everything in Insulation"

Mica
Vulcanized Fibre
Varnished Cloth
Insulating Tapes

Waxes
Asphalts
Compounds
Insulating Varnish

The above are only a few of our products. Write us for anything in this line you may require.

MITCHELL-RAND M'FG CO.
103 John St., New York City



**Save
Wear
and
Tear
by**

Installing on all your cars **HENSLEY Trolley Wheels**

Patented slot in hub cavity provides for positive forced feed lubrication.

Wheel turns freely—no slippage.

Cast in one piece—no bushings *unless specified,*

Made in all sizes.

Ask for our Catalog

Hensley Trolley & Mfg. Co.
Detroit, Mich.

WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.

VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.

ORIGINATED the use of **NON-CORROSIVE** Wire for Electric Car Heaters.

ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York



You will buy

CLEVELAND Fare Boxes

Eventually—

Why not now?

Cleveland Fare Box Co.
CLEVELAND, OHIO

Consolidated High Grade Products

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO. Albany New York

HEATING AND VENTILATING YOUR CARS is the problem to-day. Let us show you how to do both with one equipment. Now is the time to consider this change before you start your cars through the shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY
1759 Mt. Elliott Ave., Detroit, Mich.

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

The Best Shade Rollers for Cars

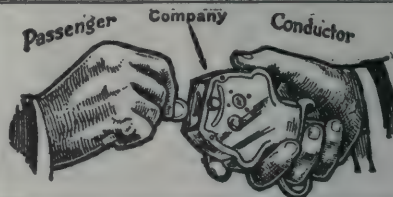
SPECIAL shade rollers for cars, that will last and give satisfaction for years, and yet cost but little more than the poorest you can buy, are made by the Stewart Hartshorn Co., E. Newark, N. J. This company is by far the largest shade roller manufacturer in the world. It is able to give high quality at lower prices because of the enormous output. Write for catalog, stating wants. You are always protected when you buy shade rollers if they bear the signature *Stewart Hartshorn*



Use them in your terminals—
**PERY TURNSTILES
or PASSIMETERS**

Faster than the ticket seller

Pery Manufacturing Co., Inc.
30 Church Street, New York City



**Direct
Automatic
Registration**
By the
Passenger
**Rooke Automatic
Register Co.**
Providence, R. I.

The Big Three

**D & W Fuses, Deltabeston Wire
D & W Oil Fuse Cutouts**

D & W Fuse Co., Providence, R. I.

JACKS

Barrett Truck and Car Jacks
Barrett Emergency Car Jacks
Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

Real Values

It is one of the most difficult problems to calculate the value of an advertisement.

Its *immediate* result may be nil—and it may be called a failure by short-sighted men.

Yet its educational value, and its product of real "good-will" among the purchasing public can often be placed at thousands of dollars.

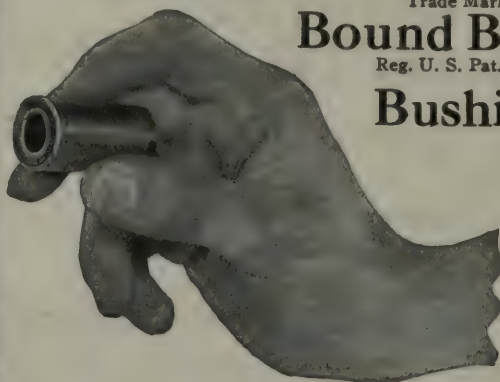
The *steady* advertiser in each issue makes a stronger and more successful appeal than the one who *plunges* once a year and rests on his laurels the remainder of the time.

Electric Railway Journal

Member Audit Bureau of Circulations

A Recessed

Trade Mark
Bound Brook
Reg. U. S. Pat. Off.
Bushing



This is a close-up of a Bound Brook trolley wheel graphite bushing, showing the neat groove recessed in each end for the insertion of graphite to take care of any end thrust. The graphite placed in these recesses goes through the same careful course of thorough preparation, as the graphite within the casting.

All genuine graphited "Oil-less" Bearings have always been made at Bound Brook, N. J., in the United States of America, by the

Bound Brook Oil-less Bearing Co.

FORMERLY

Graphite Lubricating Company

"Boyerized" Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
Case Hardened Brake Pins.	Manganese Transom Plates
Case Hardened Bushings	Manganese Body Bushings
Case Hardened Nuts and Bolts	Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

Snow Scrapers for All Types of Cars That Make Good Absolutely

Prompt Delivery

ROOT SPRING SCRAPER CO., Kalamazoo, Mich.

It Pays to carry an advertisement in the **ELECTRIC RAILWAY JOURNAL** every issue of the year because you obtain proportionately better **Results**

Bonham Traffic Recorders

Show origin and destination of every fare collected as well as other valuable traffic data.

The Bonham Recorder Co., Hamilton, O.

Holden & White Inc.

Electric Railway Sales Distributors for:

Wasson Air-Retrieving Trolley Bases. (U. S.)
Garland Ventilators. Miller Trolley Shoe.
Perry-Hartman Center Plates and Side Bearings.
Watson Car Lighting Regulator.
Anderson Brake Slack Adjusters.
Reliance Air Sanders. Air Rectifier.

Chicago District Representatives for:

Drew Line Material.
Columbia Car & Shop Equipment.
Reciprocating Track Grinder.
Lincoln Rail Bonding and Bonds.

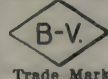
1508 Fisher Building

CHICAGO

The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this



Trade Mark

BONNEY-VEHSLAGE TOOL COMPANY
61 New Jersey R.R. Ave.,
Newark, N. J.

UNIVERSAL ANTI-SLIP TREADS

cars and station steps.

Universal Safety Tread Company

Waltham, Mass.



NUTTALL TROLLEY HARPS

STRONGLY made of malleable iron frames with rolled Steel Shanks. The simplest, most practical



and efficient methods of holding the parts in place with the greatest protection from wear are employed—axle pins with low frictional resistance; phosphor-bronze springs protected from wear by removable contact washers and also by their position, all combine to make Nuttall harps the lightest possible with the demanded durability.

NUTTALL
PITTSBURGH

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

STUCKI SIDE BEARINGS

are truly frictionless. The roller instead of turning on a pin rolls freely like a rolling pin.

A. Stucki Co.
Oliver Bldg.
Pittsburgh, Pa.



AMERICAN CARBON AND GRAPHITE MOTOR AND GENERATOR BRUSHES are made in all sizes and shapes, with or without pig-tails, and in grades suitable for all classes of Motor and Generator service.

AMERICAN CARBON & BATTERY WORKS EST. LOUIS, ILL.
OF NATIONAL CARBON CO., INC.

UNION SPRING & MFG. CO. SPRINGS

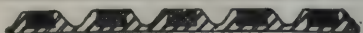
COIL AND ELLIPTIC
M. C. B. Pressed Steel Journal Box Lids
General Office: Fulton Bldg.
PITTSBURGH, PA.

Works: New Kensington, Pa.
50 Church St., New York. 1204 Fisher Bldg., Chicago, Ill.
Missouri Trust Bldg., St. Louis, Mo.

RAILWAY UTILITY COMPANY

Sole Manufacturers
"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings; also
ELECTRIC THERMOMETER CONTROL
of Car Temperatures.

141-151 WEST 22D ST. Write for Catalogue 1328 BROADWAY
Chicago, Ill. New York, N. Y.



MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.
KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.
Above products are used on all leading railways. For details address

AMERICAN MASON SAFETY TREAD CO.
Main Offices: Lowell, Mass. Branch Offices: Boston, New York City, Chicago, Philadelphia, Kansas City, Cleveland, St. Louis.

HORNE RAILWAY DEVICES

Horne Double Acting Brakes
Giant Geared Brakes
Differential Staffs Brakes
Sterling Safety Brakes
Sterling Trolley Bases
Sterling Sand Boxes
Lord Screenless Air Cleaners for Compressors
Q-P Trolley Catchers
Hydrogrounds and Lightning Arresters
Fenders and Wheelguards
Controller Fingers
Friction and Rubber Tape
Packing and Gaskets
Air Hose and Rubber Specialties

HORNE MANUFACTURING CO., 50 Court St., Brooklyn, N. Y.

SEARCHLIGHT SECTION

IMMEDIATE SHIPMENT

TURBINES

- 1—500 KW. Westinghouse horizontal turbo unit, 3 ph., 60 cy., 360 V., 3600 rpm.
- 1—500 KW. General Electric Curtis steam turbine, 3 ph., 60 cy., 1800 rpm., 2300 volts, 150 lb. steam pressure, vertical type.
- 1—500 KW. Westinghouse Horizontal Turbo Generating Unit wound for 3 phase, 60 cy., 2300 volts, speed 3600 rpm., condensing duty.

DIRECT CONNECTED ALTERNATING UNIT

- 1—800 KW. Allis-Chalmers, 2300 v., 3 ph., 60 cy., 90 rpm. generator, direct connected to 22 and 44 x 48" Reynolds Corliss engine.

60 CYCLE ROTARY CONVERTERS

- 1—300 KW. West. rotary converter, 3 ph., 60 cy., 370 v., A.C., 575 v., D.C., 600 rpm., with 3—185 KVA. Gen. Elec., 60 cy. transformers, 2200-370 volts.
- 1—200 KW. Westg. 3 ph., 60 cy., 720 rpm., Rotary Converter, 575 volts D.C., 360/370 volts A.C.
- 1—150 KW. West. 3 ph., 60 cy. rotary converter, 550 v., 720 rpm., with two Scott connected transformers.

ARCHER & BALDWIN, Inc.

114-118 Liberty Street, New York City Telephone 4337-4338 Rector

Railway Motors

Ten Westinghouse No. 306 Railway Motors, Type CA.

Eight Westinghouse No. 317-A-2 Railway Motors with gears and pinions, ratio 21:68, 6-in. axle bearings, complete with double-end ALF control.

Four Westinghouse No. 317-A with gears and pinions, ratio 21:68, 6-in. axle bearings.

Rotary Converters

Three 300-kw. General Electric Type TC Rotary Converters, 3 phase, 60 cycle, 6 pole, 600/1200 volts d.c., 379 volts a.c., 1200 r.p.m.

Three 300-kw. General Electric 3-phase Transformers, oil cooled, 12,000/24,000 volts primary, 370 volts secondary, with four 2½ per cent reduced-capacity taps in primary and 50 per cent starting tap in secondary.

Complete switchboard equipment.

We have on hand all classes of Power Machinery



114 Liberty Street, New York City

Gasoline Passenger Car



\$1500 F.O.B.

Ranier
Minn.

Ready to
operate

American Traction Company, Security Building
Minneapolis, Minn.

Receiver's Sale of Electric Railroad Supplies

LEGAL NOTICE

Notice is hereby given that the undersigned, Charles D. Davidson, as Receiver of the property of the Gary and Interurban Railroad Company and of the East Chicago Street Railway Company, pursuant to authority given to him by order of the District Court of the United States for the District of Indiana in the cause entitled "Central Trust Company of Illinois et al vs. Gary and Interurban Railroad Company et al, No. 134 In Equity," will at his office at 800 Broadway, Gary, Indiana, on the

25th day of February, 1918

at ten o'clock, A.M., and from day to day thereafter until sold, offer for sale at private sale for cash a stock of electric railroad supplies consisting of repair parts for the following: GE-205-B motors, Westinghouse 112-B motors, No. 15 Cooper heater, McQuire-Cummings high speed trucks, Westinghouse L-4 control, and other items.

Dated this 23rd day of January, 1918.

CHARLES D. DAVIDSON,
as Receiver of the Gary and Interurban Railroad Company and of the East Chicago Street Railway Company.

85 lb. A. S. C. E. Relays

16,000 tons—with Angle Bars to match. Available immediate shipment and centrally located.

We positively own these Rails and offer same in carload lots and over.

25,000 tons—Relays—sizes 25 lb. to 100 lb., in stock our Pittsburgh yards and vicinity.

Immediate shipment guaranteed and prices very attractive.

Carload and less than carload inquiries and orders solicited.

Rails cut to length for structural purposes.

Frogs, Switches, Bolts, Nuts, Spikes and all Accessories.

L. B. FOSTER COMPANY
Park Bldg. Pittsburgh, Pa.

CLEVELAND ARMATURE WORKS

Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years.

RAILS Locomotives, Cars, Machinery, Piling, Tanks

We've got too much
to list here, so we've issued

68 pages BULLETIN 230 Get it now!
ZELNICKER IN ST. LOUIS

FOR SALE VERY REASONABLE

6—Single truck

CLOSED CARS

32' overall; seat 28; Westinghouse 68 motors; K. controllers; in good condition.

Manhattan Bridge Three Cent Line
333 Gold Street, Brooklyn, N. Y.

NEW ADVERTISEMENTS for the

SEARCHLIGHT SECTION

can be received until 10 A.M.
Wednesday for Saturday's issue.



OPEN and CLOSED
MOTOR and TRAIL

Write for Prices and Full Particulars to

ELECTRIC
EQUIPMENT Co.
601 Commonwealth Bldg. Phila. Pa.

SEARCHLIGHT SECTION

FOR SALE

5 New Double Truck

P-A-Y-E CARS

Double End Operation.

Length overall 45' 0"

Width overall 8' 5"

Seating capacity 44

Delivery 30 Days

**McGuire-Cummings
Mfg. Co.**

111 West Monroe Street
Chicago, Illinois

RATES:

1 inch—\$3.00

4 inches—\$2.90 an inch

(The above rate applies to a 4-inch space in one issue, a 2-inch space in two issues, or a 1-inch space in four issues. The larger spaces following may be used up in a similar way.)

8 inches—\$2.80 an inch

15 inches— 2.70 an inch

27 inches— 2.60 an inch

FOR SALE

5—300 amp., 45,000-volt

Oil Switches

triple pole, single throw, indoor type, remote control, G. E., F-K-10; practically new.

8—High-tension Current

Transformers

G. E. Co., 20/40 amp., ratio 4/8 to 1, 45,000 volts; practically new.

1—High-tension Current

Transformer

27,000 volts, ratio 20 to 5, General Electric Co.

375—4½ x 5½ x 5½—2 pin Carbolineum dipped Long Leaf Yellow Pine

Cross Arms

good as new.

TEXAS ELECTRIC RAILWAY
Dallas, Texas

WANTED

General Electric Co.

SYNCHRONOUS CONVERTER
#130,724

Type H.C.—12—500—600, Form P., Amperes 909, Volts 550.

STARTING REACTANCE

Type OT—67—75/
/60—410

Cycles 60, K.V.A. 75.

416 Amperes per phase, 60 volts per phase.

For 430 Volt circuit.

TRANSFORMERS—Single Phase

Type O.C.—Form B-1.

60 cycles—185 K.W.

Volts 10,000/410.

Newport News & Hampton Ry.,
Gas & Electric Co.
Hampton, Va.

FOR SALE

Electric Locomotive

Weight, 88,000 lbs. 4 G.E.-55, 100 H.P. motors, Type M control, straight and automatic air brake, M.C.B. trucks.

ALBANY SOUTHERN RAILROAD
Rensselaer, N. Y.

Transformers

22000 Volts

FOR IMMEDIATE DELIVERY

3—200 KVA—Never been used

General Electric Type H Single Phase, 60 Cycle, 22000 to 2300 Volts, with two 5% reducing taps on high tension winding. Outdoor Type.

**General Engineering &
Management Corp.**

141 Broadway, New York

COPY

for the

SEARCHLIGHT SECTION

can be received until 10 A. M.
Wednesday for Saturday's issue.

Belted Generator

FOR SALE

300 K.W., 550 Volt D.C.
Sprague Electric Co.

**The Chillicothe Electric R. R.
Light and Power Co.**
Chillicothe, Ohio

WANTED TO LEASE

Fully equipped up-to-date

Electric Railway Park

Griffiths & Crane
Builders and Operators of Amusement
Parks.

(Many years' experience)
Electric Railway references

P. O. Box 465
Philadelphia

*There is a
Searchlight Section
in each of
the following papers:*

[1]
American Machinist

[2]
Coal Age

[3]
Electrical World

[4]
Electrical Merchandising

[5]
Electric Railway Journal

[6]
Engineering and Mining Journal

[7]
Engineering News-Record

[8]
Metallurgical and Chemical
Engineering

[9]
Power

Each of these 9 papers
is the leading periodical of
the industry it serves.

Searchlight advertise-
ments will get you in touch
with the important men of
these important industries.

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost three cents a word, minimum charge 50 cents an insertion, payable in advance; less 10% if one payment is made in advance for 4 continuous insertions.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want

ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost five cents a word, minimum charge \$1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost \$2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/4 p. (1 1/2 x 3 3/4 ins.).....	\$5.00	1 in. (1 x 2 1/2 ins.).....	\$3.00
1/2 p. (2 1/2 x 3 3/4 ins.).....	10.00	4 inches (4 x 2 1/2 ins.)..	11.60
3/4 p. (3 1/2 x 3 3/4 or 2 3/4 x 7 ins.).....	20.00	8 inches (8 x 2 1/2 ins.)..	22.40
1 p. (10 1/2 x 3 3/4 or 5 x 7 ins.)....	40.00	15 inches.....	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page.....	\$80 a page	18 pages.....	\$56 a page
3 pages.....	72 a page	26 pages.....	52 a page
6 pages.....	64 a page	32 pages.....	50 a page
9 pages.....	62 a page	40 pages.....	48 a page
12 pages.....	58 a page	52 pages.....	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

POSITIONS VACANT

ACCOUNTANT or auditor, familiar with light, power, street railway and water accounts; state age, experience, reference, married or single and salary expected. Applicant must be efficient, capable and accurate. Middle South-west city of 30,000 inhabitants. P-40, Elec. Railway Journal, Chicago.

COMPETENT track foreman wanted immediately. Must be experienced in street railway work, including electric welding and rail bonding. Salary \$100 per month. Give experience, references, photo, date can report, and all necessary information in first letter. Galesburg & Kewanee Electric Railway Company, Kewanee, Illinois.

COMPETENT Signal Man wanted for Automatic A. C. Track Circuit Signals and Trolley Contracts. Ft. Dodge, Des Moines & So. R. R. Co., Boone, Iowa.

ENGINEER Maintenance of Way; for about 170 miles city and interurban railway system in the central west; familiar with track construction and maintenance in paved city streets as well as interurban tracks and bridges. Address giving reference and salary expected. P-42, Elec. Ry. Journal, Chicago.

ENGINEER: Young graduate engineer for position as office engineer to collect detail and do general service work for the general manager in connection with city and interurban railway system. Can be either electrical, mechanical, or civil engineer, with some ambition for the future. Address, giving reference and salary expected. P-43, Elec. Ry. Journal, Chicago.

FIRST class general all-round shop man wanted for small Southern road. One who can do all kinds of general car work and necessary carpenter, painting, blacksmith, and machine work and armature winding. Tell us all about yourself in first letter and advise as to the minimum salary you will start on. Excellent opportunities for advancement. P-47, Elec. Ry. Journal, Chicago.

GENERAL foreman or assistant master mechanic wanted, capable of handling men, by a street railway company in New England, experienced in surface car inspections and repairs. Good salary. Permanent position to right man. P-53, Elec. Ry. Journal.

MASTER mechanic wanted for a large city and interurban property; one of the best opportunities in the country for a first-class, competent and energetic man. Write fully, giving all particulars as to education and experience. P-27, Electric Railway Journal, Cleveland.

POSITIONS VACANT

MASTER mechanic wanted for small road. State your qualifications and salary wanted in first letter. This is a desirable and permanent position for the right man. Delightful and healthy climate and position offers good chances for regular increases in salary in direct proportion to results you obtain. P-48, Elec. Ry. Journal, Chicago.

MOTORMEN wanted for one-man cars, 22 cents per hour to start on. Exceptionally good chances for advancement to more responsible positions. P-49, Elec. Ry. Journal, Chicago.

SAFETY expert, experienced in street railway traffic operation wanted by a large city and interurban property. Attractive position for good man. P-37, Elec. Ry. Journal, Cleveland.

STOREKEEPER, experienced in electric railway materials, capable of taking charge of stock of approximately \$25,000 or acting as receiving clerk for general foreman at a general storehouse. Give age, detailed experience for the last five years, salary expected, and reference in first letter. P-41, Elec. Ry. Journal, Philadelphia.

SUPERINTENDENT transportation wanted for city and interurban operation in Central West. System of two hundred miles. Applications desired only from men thoroughly familiar with every detail. P-39, Elec. Ry. Journal, Chicago.

WORKING foreman wanted to take charge of Line Work for a Trolley Road of about 30 Miles in Eastern Pennsylvania; one who understands trolley and telephone work; must also be handy with tools. P-19, Electric Railway Journal, Philadelphia.

POSITIONS WANTED

ACCOUNTANT, 10 years' experience, thoroughly conversant with Interstate Commerce Commission and Public Service Commission requirements, desires position where ability will further advancement. PW-45, Elec. Ry. Journal, New York City.

AUDITOR, employed by small traction company, solicits change; 16 years' experience; age 39; married; references. PW-20, Electric Railway Journal, Cleveland.

EXECUTIVE, now employed, age 39, would consider a change, south preferred. Experience, constructing and operating of electric light and railway transmission, distribution, plants and substations. Ten years in present position, giving entire satisfaction. Eighteen years with present employer on other properties. PW-46, Elec. Ry. Journal.

POSITIONS WANTED

MASTER mechanic wants position on street or interurban lines. Good references as to ability and character. Fifteen years' experience. PW-50, Elec. Ry. Journal, Chicago.

POSITION wanted as master mechanic or general foreman; thoroughly experienced on city and interurban equipment, Type K, Sprague, Type M and H. L. control, straight and automatic air. PW-54, Elec. Ry. Journal, Chicago.

SUPERINTENDENT or assistant superintendent of transportation, 40 years of age; expert on schedules; 21 years' experience; willing to go anywhere; best of references can be furnished. PW-6, Elec. Ry. Journal, Chicago.

SUPERINTENDENT wants position; knows business track up, including office. Have engineering experience; also designed and built one-man car. Married; over draft age; employed; good reason for change; speak Spanish; can leave country. PW-44, Elec. Ry. Journal, Philadelphia.

TRAFFIC manager, general superintendent or superintendent transportation. Fifteen years' executive and operating experience. For ten years have specialized in traffic problems. Expert on schedules. Can handle men and show results through economical operation. Forty years old. Will furnish best of references as to energy, ability, character and sobriety. PW-51, Elec. Ry. Journal.

WANTED—To communicate with an electric railway company desiring services of high-class executive in capacity of manager, superintendent or chief engineer; south preferred. PW-28, Elec. Ry. Journal, Philadelphia.

YOUNG married man, 13 years' experience transportation department, desires permanent position with opportunity for advancement. Expert schedule man. Also thorough knowledge operating rules and conditions. Best references from present employers. PW-52, Elec. Ry. Journal, Chicago.

EMPLOYMENT AGENCIES

Correspondence Service

The undersigned provides a confidential service designed to locate openings through correspondence for men earning not less than \$2,500 and up to \$25,000; all lines. Not an employment service, covering individual negotiations. Established 1910. Complete privacy assured; present connections in no way jeopardized. Send name and address only for explanatory details. R. W. Bixby, H1 Niagara Square, Buffalo, N. Y.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry
with Names of Manufacturers and Distributors

Acetylene Service and Apparatus.
Oxweld Acetylene Co.

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg. Co.

Air Rectifiers.
Holden & White, Inc.

Alloys, Steel & Iron.
(See also Bearings & Bearing Metals.)
Titanium Alloy Mfg. Co.

Anchor, Guy.
Electric Service Supplies Co.
Holden & White, Inc.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry.
Johns-Manville Co., H. W.

Batteries, Storage.
Electric Storage Battery Co.

Bearings & Bearing Metals.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side.
Baldwin Locomotive Works.
Holden & White, Inc.
Stucki Co., A.

Bearings, Oilless, Graphite, Bronze and Wood.
Bound Brook Oil-less B. Co.

Bearings, Roller and Ball.
Gurney Ball-Bearing Co.
Railway Roller Bearing Co.

Bells and Gongs.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail.
Niles-Bement-Pond Co.
Zelnicker Sup. Co., W. A.

Boilers.
Babcock & Wilcox Co.

Boiler Cleaning Compounds.
Dearborn Chemical Co.
Johns-Manville Co., H. W.

Boiler Coverings.
Johns-Manville Co., H. W.

Boiler Tubes.
National Tube Co.

Bond Testers.
American Steel & Wire Co.

Bonding Apparatus.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Oxweld Acetylene Co.

Bonds, Rail.
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Lincoln Bonding Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Book Publishers.
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel.
Niles-Bement-Pond Co.

Braces, Rail.
Kilby Frog & Switch Co.

Brackets and Cross Arms.
(See also Poles, Ties, Posts, Etc.)

Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Lindsley Bros. Co.
Ohio Brass Co.

Brake Adjusters.
Holden & White, Inc.

Brake Shoes.
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts.

Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Holden & White, Inc.
Horne Mfg. Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Trac. B. Co.

Brooms, Track, Steel or Rattan.
Paxson Co., J. W.
Zelnicker Supply Co., W. A.

Brush Holders.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Brushes, Carbon.
American Carbon & Battery Wks.
General Electric Co.
Jeandron, W. J.
Morgan Crucible Co.
United States Graphite Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite.
Dixon Crucible Co., Jos.
United States Graphite Co.

Bushings, Case Hardened and Manganese.
Bemis Car Truck Co.

Bushings, Fibre.
Diamond State Fibre Co.

Bushings, Graphite and Wooden.
Bound Brook Oil-less B. Co.

Cables. (See Wires and Cables.)

Carbon Brushes. (See Brushes, Carbon.)

Car Equipment. (For Fenders, Heaters, Registers, Wheels, etc.—See those headings.)

Car Trimmings. (For Curtains, Registers, Doors, Seats, etc.—See those headings.)

Cars, Oil-Electric.
Electric Car & Locomotive Corp.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand.
Carr Co., C. E. A.
Electric Equipment Co.

Cars, Self-Propelled.
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
Frankel Connector Co.
Horne Mfg. Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
St. Louis Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Castings, Malleable and Brass.
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Horne Mfg. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley.
Electric Service Supplies Co.
Holden & White, Inc.
Horne Mfg. Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car.—(See Head Lining.)

Certified Public Accountant.
Swan, James T.

Chemists.
Little, Inc., Arthur D.

Circuit Breakers.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
Frankel Connector Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Mathias.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers, Track.—(See also Snow-Plows, Sweepers and Brooms.)
Brill Co., The J. G.
Ohio Brass Co.
Root Spring Scraper Co.

Clusters and Sockets.
General Electric Co.

Coal and Ash Handling.—(See Conveying and Hoisting Machinery.)

Coasting Recorders.
Railway Improvement Co.

Coil Banding and Winding Machines.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
D & W Fuse Co.

General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines.
International Register Co., The

Commutator Slotters.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Wood Co., Chas. N.

Commutator Stones.
Ideal Commutator Dresser Co.

Commutator Truing Devices.
General Electric Co.

Commutators or Parts.
Cameron Elec'l Mfg. Co.
Cleveland Armature Works.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air.
General Electric Co.
Westinghouse Trac. B. Co.

Condensers.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conduits, Underground.
Johns-Manville Co., H. W.

Connectors, Solderless.
Frankel Connector Co.

Controller Regulators.
Electric Service Supplies Co.

Controllers or Parts.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Horne Mfg. Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.

Controlling Systems.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveying and Hoisting Machinery.
Columbia M. W. & M. I. Co.
Green Engng. Co.

Cord, Bell, Trolley, Register, etc.

Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebbling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers.
Electric Service Supplies Co.
Samson Cordage Works.
Wood Co., Chas. N.

Couplers, Car.
Brill Co., The J. G.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

Couplings, Conduit.
Horne Mfg. Co.

Cranes. (See also Hoists.)
Niles-Bement-Pond Co.

Croosoting. (See Wood Preservatives.)

Cross Arms. (See Brackets.)



Model 341
A.C. and D.C. Voltmeter

One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D. C. Wattmeter, Model 329 Polyphase Wattmeter, and Model 370 A. C. and D. C. Ammeter.

The characteristics of the group are extreme accuracy (guaranteed within a fraction of 1% full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding, and the legibility and remarkable uniformity of the hand calibrated scales.

Quality That Speaks

Far more than we can say about Weston pre-eminence is revealed fully, unmistakably, emphatically, in every detail of

Weston

Indicating Instruments

Their superiority is so marked, so easily demonstrated by test that only one decision will be possible after you have made comparisons.

Weston Indicating Instruments include a great variety of groups for portable or switchboard service on A. C. or D. C. Circuits, Instruments designed expressly for testing and laboratory use, for motor car and boat electrical systems, and many others for special purposes. Write for Bulletins or Catalogs describing those which interest you.

Weston Electrical Instrument Company

21 Weston Ave., Newark, N. J.

New York
Philadelphia
Pittsburgh
Cleveland
Cincinnati

Chicago
Boston
Buffalo
Richmond
San Francisco
Florence

Denver
Detroit
St. Louis
Toronto
Winnipeg

Johannesburg, S. Africa.

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NATIONAL RAILWAY APPLIANCE COMPANY

50 East 42d St., NEW YORK CITY

Hegeman-Castle Corporation Chicago National Railway Appliance Co. Washington, D. C.

RAILWAY SUPPLIES

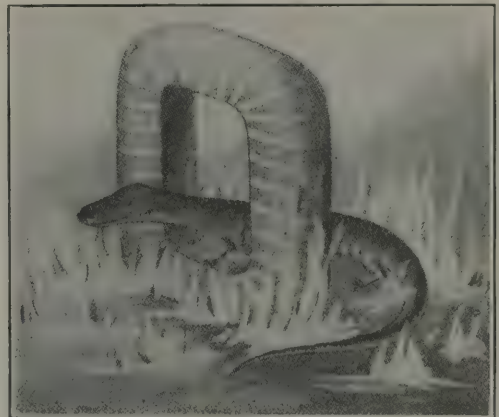
Selling Agents for

Tool Steel Gears and Pinions
Johnson Fare Box Perry Side Bearings
Hartman Centering Center Plates
Wasson Trolley Bases
Rimco Rubber Insulated Pliers
Garland Ventilator Electric Arc Welders
High Class Railway Varnishes and Enamels
Axles and Forgings Elastic Car Waste

Special Agents for

TOOL STEEL GEAR & PINION CO.
RUBBER INSULATED METALS CORP.
JOHNSON FARE BOX CO.
C. & C. ELECTRIC & MFG. CO.
HOLDEN & WHITE, INC.

General Agents for ANGLO-AMERICAN VARNISH CO.
Eastern Agents for UNION FIBRE CO.
Eastern & Southern Agents for LACLEDE STEEL CO.



Get those coils back into service—quick!

Don't let LABOR SHORTAGE hold them up in your coil department. You can't get more men—but you can save time and money by sending the coils to us for re-insulation with

SALAMANDER Pure Asbestos

We will return them promptly—better insulated and more durable than when new.
"Salamander" asbestos wire excels in insulating value and cannot burn out under the severest overload. Leading electric railways are our best customers. Write us for details now.

Independent Lamp & Wire Co., Inc.

OFFICES: 1737 Broadway, New York
FACTORIES: York, Pa., and Weehawken, N. J.

Crossing Foundations.

Balkwill Manganese Crossing Co.
International Steel Tie Co.

Crossing Signals. (See Signals, Crossing.)**Crossings, Track. (See Track, Special Work.)****Culverts.**

American Rolling Mill Co.
Bark River B. & Culvert Co.
California Cor. Culvert Co.
Canada Ingot Iron Co., Ltd.
Canton Culvert & Sile Co.
Coast Culvert & Flume Co.
Corrugated Culvert Co.
Delaware Metal Culvert Co.
Dixie Culvert & Metal Co.
Hardesty Mfg. Co., R.
Illinois Corrugated Metal Co.
Independence Culvert Co.
Iowa Pure Iron Culvert Co.
Kentucky Culvert Mfg. Co.
Lone Star Culvert Co.
Lyle Corrugated Culvert Co.
Michigan Bridge & Pipe Co.
Montana Culvert Co.
Nebraska Culvert & Mfg. Co.
Nevada Metal Mfg. Co.
New England Metal Cul. Co.
North East Metal Co.
Northwestern Sheet & I. Wks.
O'Neill Co., W. Q.
Ohio Corrugated Culvert Co.
Pennsylvania Metal Cul. Co.
Road Supply & Metal Co.
Sioux Falls Metal Cul. Co.
Spokane Cul. & Tank Co.
Tennessee Metal Culvert Co.
United States Bridge & Pipe Co.
Utah Corr. Cul. & Flume Co.
Virginia Metal & Culvert Co.
Western Metal Mfg. Co.
Wyatt Metal & Boiler Works.

Curtains and Curtain Fixtures.

Brill Co., The J. G.
Electric Service Supplies Co.
Hartshorn Company, Stewart
St. Louis Car Co.

Cutting Apparatus, Oxy-Acetylene.

Oxweld Acetylene Co.

Derailing Devices. (See also Track Work.)

Cleveland Frog & Crossing Co.

Destination Signs.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service.

Wisch Service, P. Edward

Door Operating Devices.

Consolidated Car Heating Co.
National Pneumatic Co.

Doors, Asbestos.

Johns-Manville Co., H. W.

Doors and Door Fixtures.

Brill Co., The J. G.
General Electric Co.
Hale & Kilburn Co.

Doors, Folding Vestibule.

National Pneumatic Co.

Draft Rigging. (See Couplers.)**Drills, Track.**

American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Dryers, Sand.

Electric Service Supplies Co.
Zelnicker Sup. Co., W. A.

Engineers, Consulting, Contracting and Operating.

Archbold-Brady Co.
Arnold Co., The.
Beeler, John A.
Byllesby & Co., Inc., H. M.
Ford, Bacon & Davis.
Hunt & Co., Robert W.
Jackson, D. C. & Wm. B.
Richey, Albert S.
Sanderson & Porter.
Seafeld Engineering Co.
Sloan, Huddle, Feustel & Freeman.
Stone & Webster.
White Companies, The, J. G.
Woodmansee & Davidson Engineering Co.

Engines, Gas and Oil.

Westinghouse Elec. & Mfg. Co

Engines, Steam.

Westinghouse Elec. & Mfg. Co

WHAT AND WHERE TO BUY**Fare Boxes.**

Brill Co., The J. G.
Cleveland Fare Box Co.
International Register Co., The

Fences, Woven Wire and Fence Posts.

American Steel & Wire Co.
Page Steel & Wire Co.

Fenders and Wheel Guards.

Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Root Spring Scraper Co.
Star Brass Works.

Fibre Insulation.

National Ry. Appliance Co.

Fibre and Fibre Tubing.

Diamond State Fibre Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils.)**Filters, Water**

Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus.

Johns-Manville Co., H. W.

Fireproofing Material.

Johns-Manville Co., H. W.

Flooring Composition.

American Mason Safety Tread Co.
Johns-Manville Co., H. W.

Forgings.

Eureka Co.
Standard Steel Works Co.

Frogs, Track. (See Track Work.)**Furnaces. (See Stokers.)****Fuses and Fuse Boxes.**

Columbia M. W. & M. I. Co.
D & W Fuse Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.

Fuses, Refillable.

Columbia M. W. & M. I. Co.
General Electric Co.
Horne Mfg. Co.

Gaskets.

Diamond State Fibre Co.
Johns-Manville Co., H. W.
Power Specialty Co.

Gas Producers.

Westinghouse Elec. & Mfg. Co

Gates, Car.

Brill Co., The J. G.

Gages, Oil and Water.

Ohio Brass Co.

Gear Blanks.

Carnegie Steel Co.
Diamond State Fibre Co.
Standard Steel Works Co.

Gear Cases.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
National Ry. Appliance Co.
Westinghouse Elec. & M. Co.

Gears and Pinions.

Columbia M. W. & M. I. Co.
Diamond State Fibre Co.
Electric Service Supplies Co.
National Ry. Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric.

General Electric Co.

Generators.

General Electric Co.
Lincoln Electric Co.
Westinghouse Elec. & M. Co.

Gongs. (See Bells and Gongs.)**Graphite.**

Dixon Crucible Co., Joseph
Morgan Crucible Co.

Greases. (See Lubricants.)**Grinders and Grinding Supplies.**

Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.

Guards, Trolley.

Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley.

Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
Hensley Trolley & Mfg. Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.
Star Brass Works.

Headlights.

Electric Service Supplies Co.
General Electric Co.
Kerschner Co., Inc., W. R.
Ohio Brass Co.
St. Louis Car Co.

Heaters, Car (Electric.)

Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water.

Cooper Heater Co.
Smith Heater Co., Peter.

Heaters, Car (Stove.)

Electric Service Supplies Co.
Smith Heater Co., Peter.

Hoists and Lifts.

Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Ford Chain Block & Mfg. Co.
Niles-Bement-Pond Co.

Hose, Bridges.

Ohio Brass Co.

Hose, Pneumatic and Fire.

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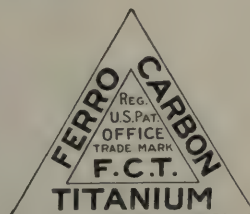
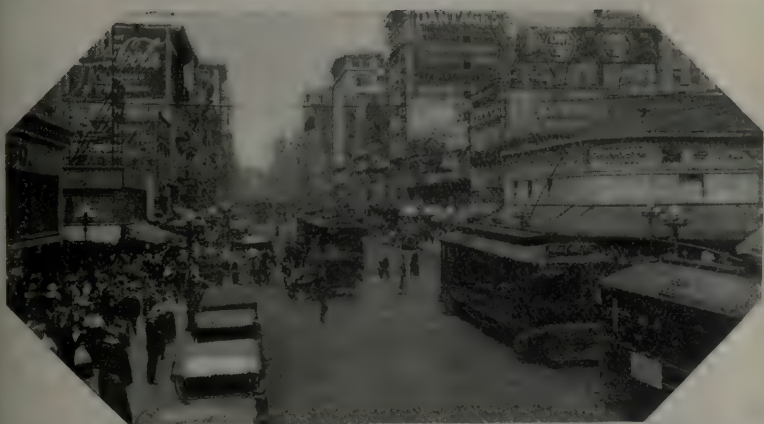


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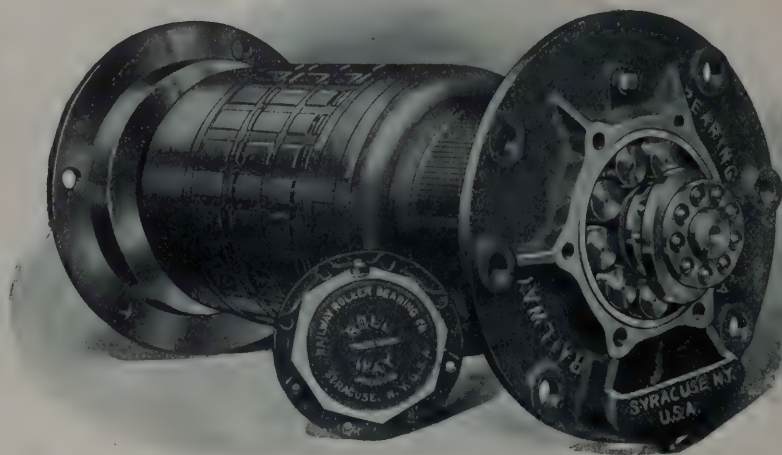


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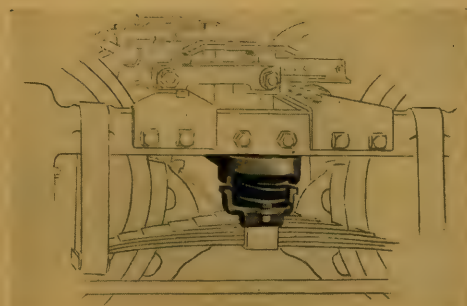
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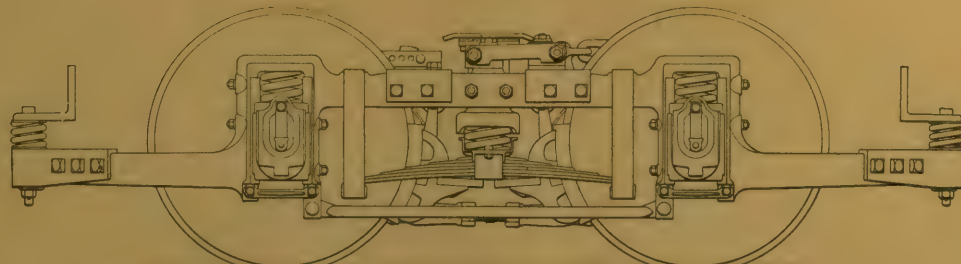
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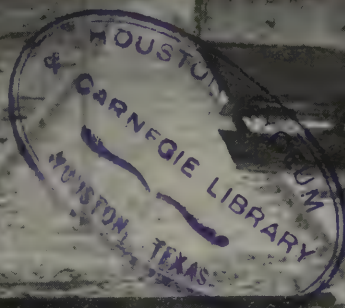
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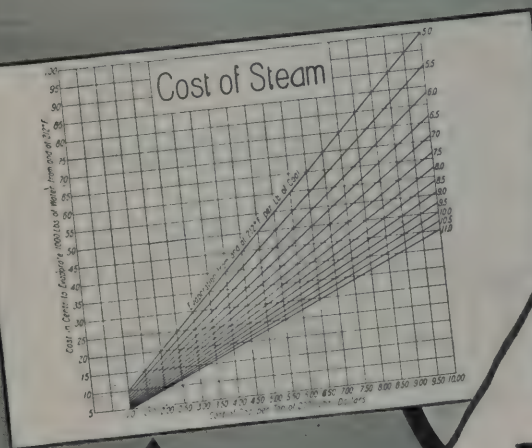
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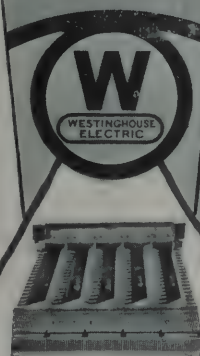
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Westinghouse

Underfeed Stokers



Knowing the price and the amount of coal burned, and the quantity of water evaporated, the above table will tell you what it should cost you in cents per lb., to generate steam. This is a very useful table. We will gladly mail you a copy upon receipt of your name and business address.



Economy and Reserve Capacity for All

Even if you have but one or two small boilers, there is no reason why your economies and your reserve capacity should not be relatively equal to those of the big central station.

Westinghouse Underfeed Stokers are built in many sizes and for all steaming requirements.

Westinghouse Electric and Manufacturing Company
East Pittsburgh, Pa.

No waste—No idle equipment—No Banked Fires— No Boilers to be held in readiness for the daily peaks. FOR, the Westinghouse Underfeed Stoker embodies in its design a wonderful flexibility— a tremendous overload capacity.



The Largest

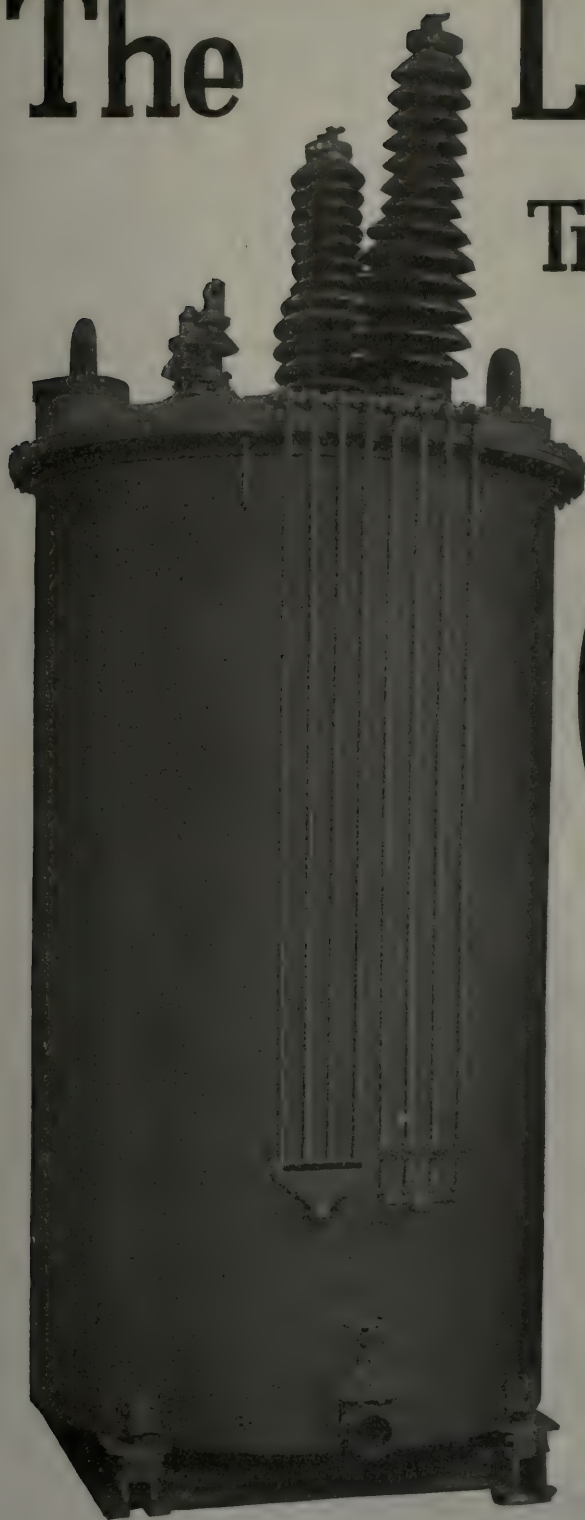
Single-Phase Transformer

Ever Built



This is one of seven 14,000 Kva. Oil-Insulated, Water - Cooled Transformers, single phase, 60 cycle, 150,000 Volt High-Tension, 13,200 Volt Low-Tension, built for one of our customers.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pennsylvania



Westinghouse

Power and Flexibility



Electrically operated train on the Pullman Division, P. R. R., equipped with Electro-Pneumatic Brakes

The Electro-Pneumatic brake possesses the power and flexibility which insures safety of High-Speed train movement and short, smooth station stops.

Brake Building our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices and Works, Wilmerding, Pa.

Atlanta, Ga.
Boston, Mass.
Chicago, Ill.
Columbus, O.

Denver, Col.
Houston, Tex.
Los Angeles, Cal.

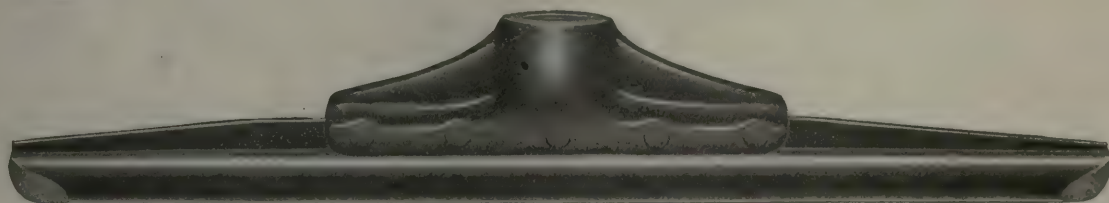


Mexico City
New York, N. Y.
Pittsburgh, Pa.

San Francisco
Seattle, Wash.
St. Louis, Mo.
St. Paul, Minn.



PRODUCTS



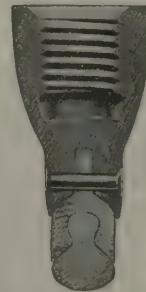
O-B Extruded Trolley Ears



On Grooved Wire
Perfect Wheel
Clearance



On Round Wire
Generous
Amount of
Metal in Lips



On Figure 8
Wire Perfect
Wheel Clearance

Uniform in Character and Results

The very nature of the manufacturing process insures uniformity in O-B Extruded Ears.

Extruded metal that is forced through a die under heavy pressure must be of the same cross-section and smooth surface throughout.

The Ears fit the wire closely and have plenty of strength to resist strains and constant wear.

The malleable iron boss is fastened securely. It is O-B sherardized.

O-B Extruded Ears show their superiority when installed on the same line with other ears.

O-B Engineers will gladly help solve your intricate overhead problems. They are familiar with construction on nearly all the lines of the country and are experienced in adapting standard materials to special conditions.

The Ohio Brass Company, Mansfield, Ohio

New York

Philadelphia

Chicago

Los Angeles

San Francisco

**It Outlasts
the Wood**



Most Economical for Ties

In selecting your standard creosote oil for treating ties you seek answers to these four questions:

?

How thoroughly and how rapidly will the oil penetrate the tie?

?

How many gallons of the oil are required to give thorough protection?

?

How long will the oil stay in the wood under the most severe service conditions?

?

How does the price per gallon compare with the service rendered?

Reilly's Improved Creosote Oil (patented) will prove its superiority to all other products under any test.

Its penetrative power is unsurpassed, for it is free from coal tar, pitch, or any of the solid or viscous ingredients that clog the pores and prevent maximum penetration.

This oil will stay in the wood throughout the physical life of the tie. All volatile elements have been eliminated, hence none of the oil will evaporate or dissolve, regardless of severe climatic conditions. And the freedom from tar absolutely prevents bleeding.

Fewer gallons of this oil are required for thorough protection, because none of it is lost after the ties have been treated. Considering service rendered, the price per gallon is far lower than the price of any competing creosote oil on the market.

Reilly's Wood Preservative Oil (Patented)

is our best product for open tank or brush treatment. A high-boiling anthracene oil—limpid and free-flowing at working temperatures. Contains no adulterant or volatile products.

Send for Sample

Republic Creosoting Company

Indianapolis, Indiana

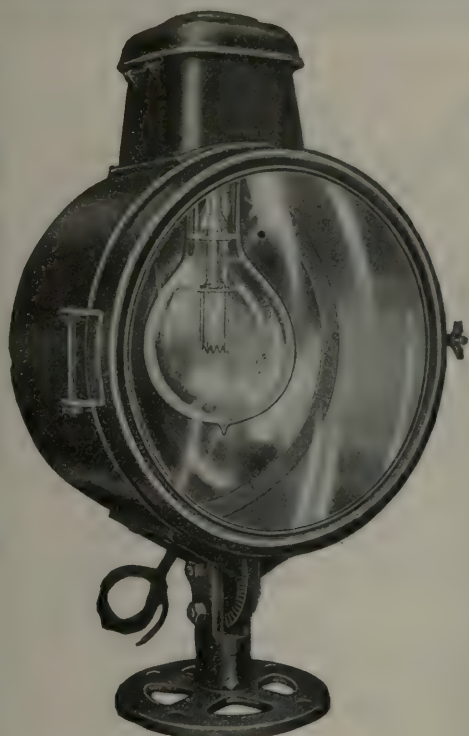
PLANTS:

Indianapolis

Minneapolis

Seattle

Mobile



Type FL-1419

And now, these famous “Golden Glow” and “Crystal Mirror” Projectors

These flood-lighting projectors are equipped with either “Golden Glow” or “Crystal Mirror” reflectors.

“Golden Glow” light is of a rich, golden color and a light in which the eye works with greatest efficiency.

Crystal Light is a white, brilliant light and is used mostly for spectacular effect.

The reflectors used in either types are the most highly developed and most efficient reflectors ever developed for this service, being made of mirrored glass.

These projectors are made in many different types and for lamps of all practical wattages.

Write for complete catalog No. 129.

ELECTRIC SERVICE SUPPLIES CO.

*Manufacturer of Railway Material
and Electrical Supplies*

PHILADELPHIA
17th and Cambria Sts.

NEW YORK
50 Church Street

CHICAGO
Monadnock Bldg.

Canadian Distributors—Lyman Tube and Supply Co., Ltd., Montreal, Toronto



Type FL-1412



Type PFL-1412

Minimize Pull-ins for Wheel Renewals

Hartman Centering Center Plates are reducing pull-ins on 95 electric railways in the United States and Canada.

They are reducing the wear of wheel flanges—doubling the life of wheels—cutting in half the costs for wheel renewals and grinding.

Hartman center plates are also reducing car nosing and they decrease power consumption on curves by 17%. They are actually accomplishing these results and 72% repeat orders on our books show the satisfaction these bearings are giving.

Holden & White Inc.

Electric Railway Distributors for The Joliet Railway Supply Company

1508 Fisher Bldg., Chicago

National Rwy. Appliance Co., New York, Washington; Grayson Rwy. Supply Co., St. Louis; W. M. McClintock, St. Paul; Alfred Connor, Denver; C. E. A. Carr, Toronto; F. F. Bodler, San Francisco; S. I. Wailes, Los Angeles; W. F. McKenney, Portland; O. H. Davidson Equip. Co., Salt Lake City.

Put Them On Your Old Cars

Hartman Center Bearings can be easily placed on old cars as well as new. Send for descriptive catalogue and dimension sheets. Try a few sets.



Hartman

Centering Center Plate

No user of steel poles can afford to ignore the savings so easily made by Drew Pole Sleeves.

You can make any steel pole weakened at the ground line better than new at less than one-fifth the cost.

More than 300 roads are using this device to reduce pole cost—an especial, vital feature now, when materials and labor may become even more scarce and costly, and when the utmost operating efficiency and economy are so urgent.

Even when the pole becomes paper thin, often after it has broken off completely, it can be kept in service—made stronger than when new.

Wherever you have a steel pole you have an opportunity to make this saving, that obviates purchasing new poles, heavy labor cost for installation and expensive disturbance of existing overhead.

Prepare Now for Your Spring Campaign

Ordering Drew Protective and Reclaiming Pole Sleeves now is splendid service insurance. You can install them any time—preferably in the warmer months for convenience—but any time through necessity. By anticipating your requirements you protect yourself on delivery. Place your order now at present prices for deferred shipment.

Send for Illustrated Data That Every Overhead Man Should Have

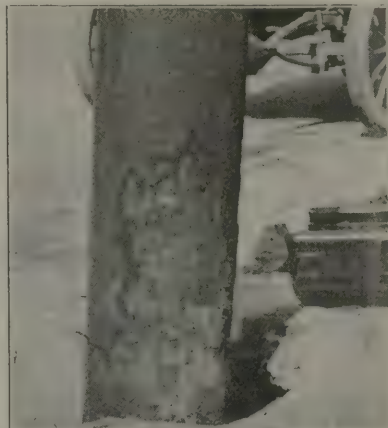
We have prepared an illustrated booklet—based on photographs secured in routine installation. The pictures tell you the story. Ask for the booklet, it is sent free.

Drew Electric & Mfg. Co.

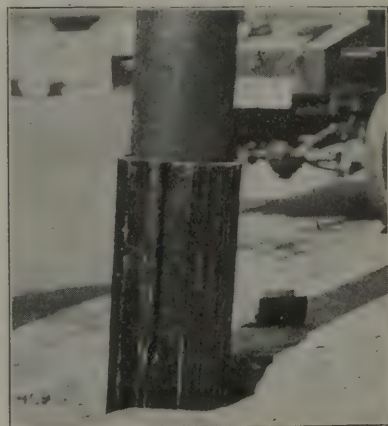
Offices and Works: Indianapolis, Ind.

Representatives in principal cities

Drew Overhead Line Material Is Standard on Keenly Managed Roads. Get Quotations



Showing the typical condition of a steel pole after being in service 7 years. Corrosion has weakened the pole to such an extent that overhead is unsafe, and immediate action is required.



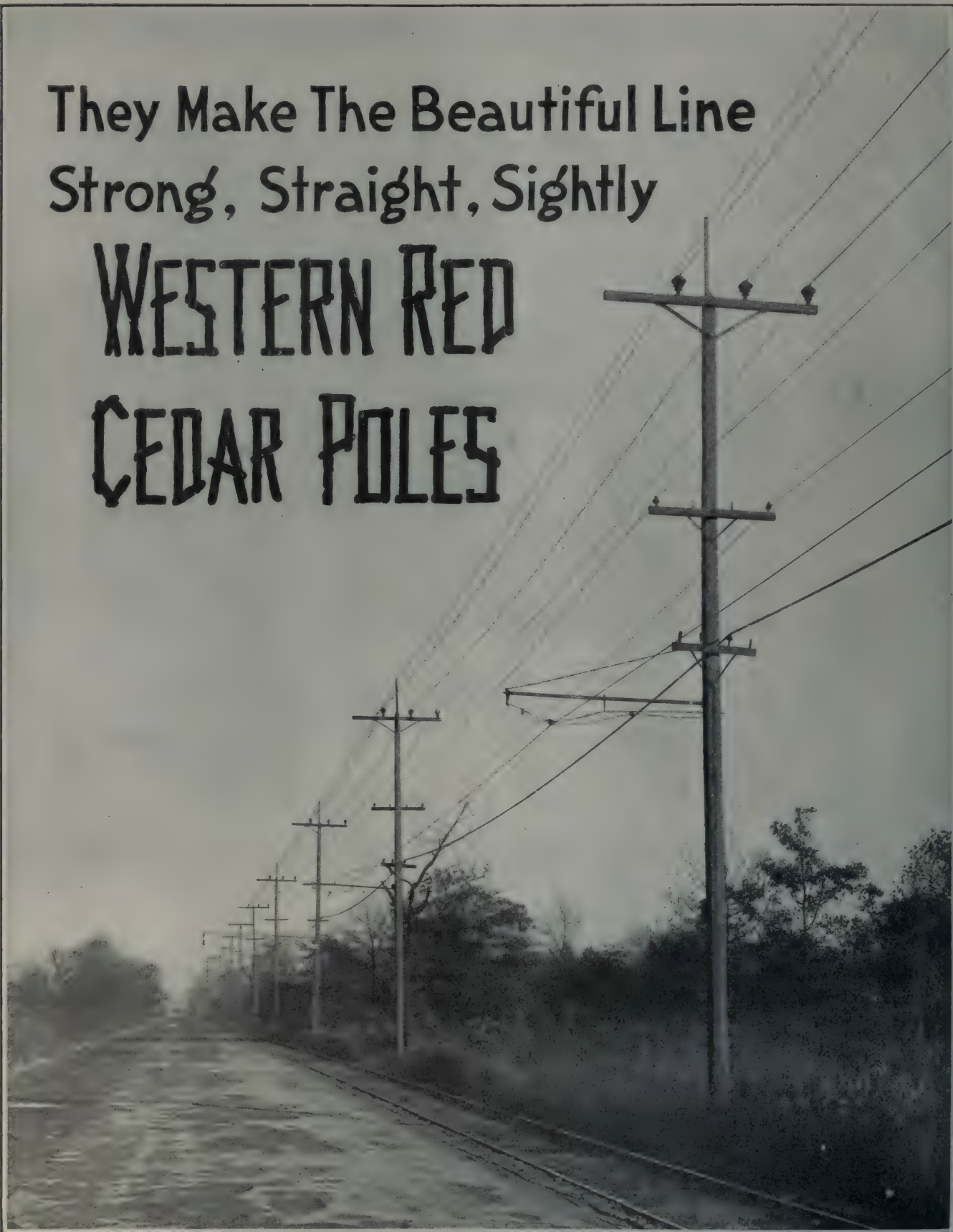
View of same pole, with Drew Protective and Reclaiming Pole Sleeve in place preparatory to doing the simple concrete work. Note how the heavy ribbed sleeve reinforces and covers the weakened portion.



View of the same pole as above after Drew Pole Sleeve had been put in place and job completed, thereby giving this pole that would have required replacement, at least 15 years of additional service.

They Make The Beautiful Line
Strong, Straight, Sightly

WESTERN RED CEDAR POLES



Lines of the Gary Street Railway Company on 11th Ave., Gary, Ind. Built of 50 ft. Western Red Cedar Poles; set in 1913.

1—3/16" Copper Clad Stranded Static Wire.

3—1/0 Stranded 33,000-Volt High Tension Wires.

2—No. 6 Arc Circuits of the Gary Heat, Light & Water Co.

2—No. 10 Telephone Wires.

1—500,000 M.C. Stranded Feeder Wire.

1—1/0 Trolley.

Western Red Cedar Association, Spokane, Washington



Phono-Electric

Makes Miles of Curves at Seattle

During 1916 the Puget Sound Electric Railway, Light & Power Company bought 4.25 miles of No.00 round Phono-Electric Trolley Wire.

This is just a continuation of orders placed since 1911, and it is especially significant because

a large part of the installations is made up of short lengths (100 ft. or less) on curves where **any** weakness would soon tell.

Phono-Electric Trolley Wire is always willing to meet the test of

The Worst Places First

Bridgeport Brass Company
Bridgeport **Connecticut**



A Bonder and A Helper

make an efficient bonding gang, using the ERICO Portable Welder. The rheostat, weighing 140 lbs., is the heaviest piece of the outfit. It can be removed from the track by one man if necessary.

The rheostat is mounted on wheels with roller bearings and is moved from joint to joint with very little effort. The welder portion of the outfit, weighing 65 lbs., rides on the rheostat while moving to the next joint.

Let us tell you more about this labor saving and current saving device.



The Electric Railway Improvement Co.
Cleveland, Ohio

One Crew - Two Sections

The Key to Mudge Efficiency

- 1. Powerful six horse power Mudge engine at side of frame within easy reach of operator. Carburetor, oil cup, grease cups, etc., can be quickly adjusted without inconvenience. Carburetor directly over and fitted to cylinder casting. Mixture goes directly into crank case. No manifold. Pre-heating from engine insures excellent combustion.
- 2. The action of the engine controlled by belt tightener lever in addition to the spark and throttle levers. The engine may be operated as free running or as direct connected, at will of operator.
- 3. Long hand brake lever which extends through seat board can be conveniently used not only by the operator but by other men on the car as well.
- 4. Powerful positive acting brakes at both sides of car, operating on all four wheels.
- 5. Heavy screen guards at both ends of car prevent dangerous loading—keep tools from rattling off—men are protected from being thrown off by sudden stops.
- 6. Warning lamps of safety for night travel both front and rear. Railroad Standard "Blizzard Lens."
- 7. Hand grab-iron extends full length of car at both ends.
- 8. Unusually wide loading space on both sides of platform.
- 9. Safety center grab rail extending from end to end can be readily grasped by men riding on car, regardless of their position on the seat board.
- 10. High side grab irons for convenience in mounting car and for shoulder leverage when taking car on and off the track.
- 11. The high side rail used all the way around platform prevents tools from dropping off and acts as guard against contact with turning wheels.
- 12. Small tools, battery, spark coils, switch, etc., are securely locked in box built into frame.

SPECIAL NOTE—Load and Far Sounding 8" Trip Warning Gong Used.

It's easy enough for one crew to handle two sections if the crew is equipped with a

MUDGE SECTION MOTOR CAR

They will cover the ground quickly—and arrive on the job fresh.

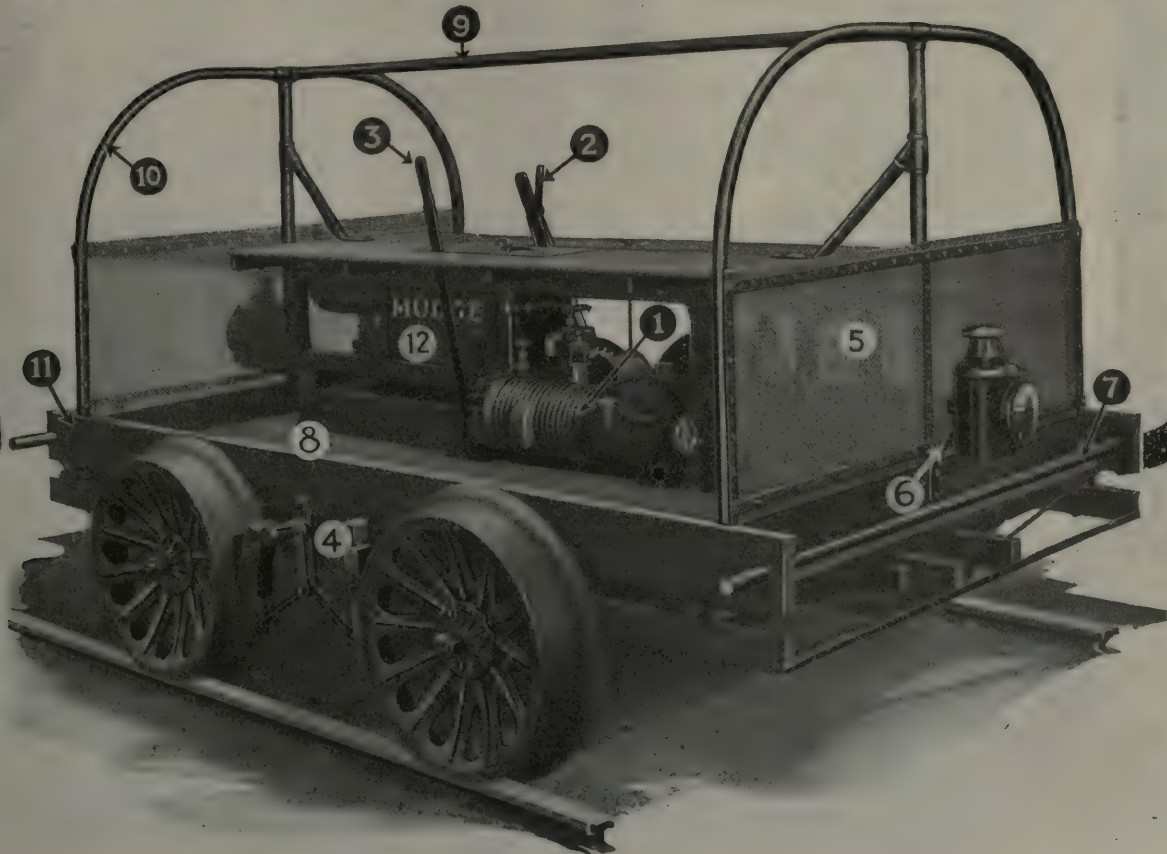
It's cheaper to burn gasoline and conserve your men than to burn up muscular energy and have them arrive at their work exhausted.

Mudge Motor Cars are made in several models to fill all your requirements. Write for illustrated folder.



Mudge & Company

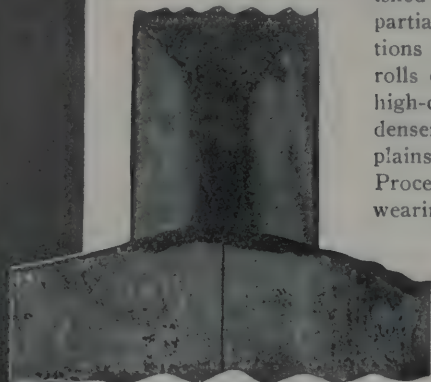
462 Railway Exchange Chicago, Ill.



How the Lackawanna Deseaming Process eliminates two very serious rail faults

Greater Safety

through removal of all seamy metal from the vital part of the base



Typical base seam—the kind that tends to open up and cause fracture.

The weak, partially decarburized surface steel of the original ingot is ordinarily finished into the rail, but if hot-milled off the partially formed rail section, at the locations of rail head and base, the finishing rolls complete their work upon clean, solid high-carbon steel and produce a harder, denser and finer finish. This, in short, explains how the Lackawanna Deseaming Process eliminates seamy bases and soft wearing surface.



Better Service

through a harder top surface that is not so apt to wear down or slough off



Rail head sloughed off under the cold-rolling action of the wheels.

TREATMENT of the partially finished rail bar as described above is the only recent *real* improvement in rail manufacture—and is the most logical way of meeting present day increases in wheel load. This is proven by the marked resistance to wear and freedom from fracture, which Lackawanna Deseamed Rails have demonstrated in several years of service.

Etching away the head and base surfaces of rails made by this process shows an entire freedom from seamy, streaky metal at these locations, and hardness tests also prove that the metal here is slightly superior to that in the body of the rail.

This deseaming process, as originated and controlled exclusively by us, is now applied (see picture below) to all Lackawanna Sections of 50 pounds per yard and over.

Those seeking safer track, greater load capacity and reduced maintenance expense can profitably study our illustrated book on The Lackawanna Deseaming Process, which we will mail on request.

Ask for our booklet "Improved Track Appliances."

292

Lackawanna Steel Company

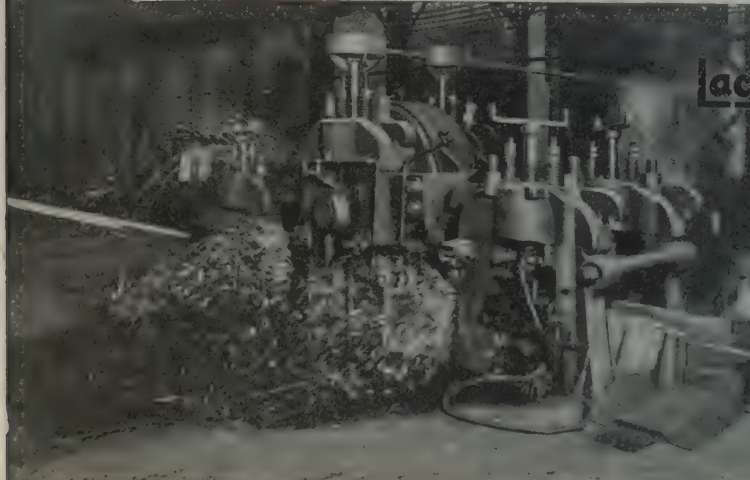
LACKAWANNA, N. Y.

ATLANTA
BOSTON
BUFFALO

CHICAGO
CINCINNATI
CLEVELAND

DETROIT
NEW YORK
PHILADELPHIA

ST. LOUIS
SAN FRANCISCO
HAVANA



Over the Top

through 2 and now in the 3d successful campaign. 1912-1918—

Industrial Depression

Jitney Bus

War Period

with the

“Indianapolis Field Outfit”

“Indianapolis” Electric Welders

“Indianapolis”
Fluxated Welding Steels

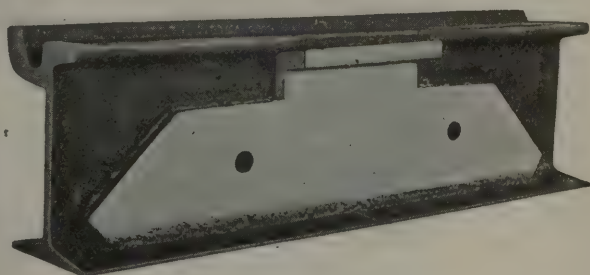
“Indianapolis”
Simplex and Apex Welded
Joints

have enabled hundreds of electric railways to maintain their physical condition at a saving in time, money and material. Maintenance departments are now facing inflated values and a famine in new material. Under present conditions the Indianapolis Outfit enables you to save 2 to 4 times as much as in pre-war period, and then the savings helped to turn deficits into dividends for many.

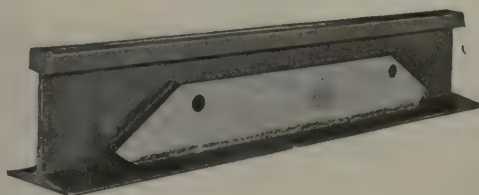
27½ Cents per Day Insures Operating
Against Delay



Cost of Current and Labor to Apply One
Pound of Electric Melt—20 to 25 Cents



The “Apex” Joint
for Guard and Girder Rails
No Bonds Required—
Conductivity 138%



The “Simplex” Joint
for High Tee Rails

Indianapolis Switch & Frog Company, Springfield, Ohio

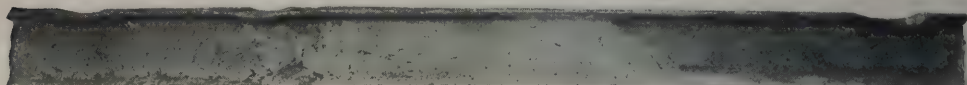


Here is a Demonstration

The mechanical tie shown in this illustration was molded in concrete for open track use.



It was placed in the tracks of the Dayton, Springfield & Xenia Southern Railway at a point where it would be subjected to the most severe use. Heavy cars at high speed have hammered this tie for **Six Years**. Its condition shows plainly—it's as good as when it was installed.



The 6" steel I-beam, shown here, has been in use for **Five Years** under a cross-over near a railroad crossing, where all cars run at reduced speed. It is merely **one** of a number similarly dented and hammered.

Just Study the Pictures
Then write us for further details.



THE DAYTON MECHANICAL TIE CO.
201 Third Street Arcade
DAYTON, OHIO



Do you make any of the Products

listed here?

Acetylene Service & Apparatus.
Advertising, Street Car.
Air Cleaners and Rectifiers.
Alloys, Steel and Iron.
Anchors, Guy.
Anti-Climbers.
Armature Shafts.
Automobiles and Buses.
Axle Straighteners.
Axles, Car Wheel.
Babbitting Devices.
Badges and Buttons.
Bankers and Brokers.
Batteries, Storage.
Battery Booster Plants.
Bearings & Bearing Metals.
Bearings, Center and Roller Side.
Bearings, Oilless Graphite, Bronze and Wood.
Bearings, Roller and Ball.
Bells and Gongs.
Benders, Rail.
Boilers.
Boiler Cleaning Compounds.
Boiler Tubes.
Bond Testers.
Bonding Apparatus.
Bonds, Rail.
Book Publishers.
Boring Tools, Car Wheel.
Braces, Rail.
Brackets and Cross Arms.
Brake Adjusters.
Brake Shoes.
Brakes, Brake Systems and Brake Parts.
Brooms, Track, Steel or Rattan.
Brush Holders.
Brushes, Carbon.
Brushes, Graphite.
Bushings, Case Hardened and Manganese.
Bushings, Fibre.
Bushings, Graphite & Wood.
Cables.
Carbon Brushes.
Car Equipment.
Car Trimmings.
Cars, Dump.
Cars, Oil-Electric.
Cars, Passenger, Freight, Express, etc.
Cars, Second Hand.
Cars, Self-Propelled.
Castings, Brass, Composition or Copper.
Castings, Gray Iron and Steel.
Castings, Malleable and Brass.
Catchers and Retrievers, Trolley.
Ceiling, Car.
Certified Public Accountant.
Checks, Employees.
Chemists.
Circuit Breakers.
Clamps and Connectors for Wires and Cables.
Cleaners and Scrapers, Track.
Clusters and Sockets.
Coal and Ash Handling.
Counting Recorders.
Coil Banding and Winding Machines.
Coils, Armature and Field.
Coils, Choke and Kicking.
Coin-Counting Machines.
Commutator Slotters.
Commutator Truing Devices.
Compressors, Air.
Condensers.
Conduits, Flexible.
Connectors, Solderless.
Controller Regulators.
Controllers or Parts.
Controlling Systems.
Converters, Rotary.
Conveying and Hoisting Machinery.
Cooling Systems.
Cord, Bell, Trolley, Register, etc.

IF so, readers of the Electric Railway Journal will be glad to have you tell them how and why to use what you offer. They will want this information so that they can apply the valuable information which they will receive through the text pages of the

Annual Maintenance Number March 16, 1918

This year a—

Cord Connectors and Couplers.
Couplers, Car.
Couplings, Conduit.
Cranes.
Creosoting.
Cross Arms.
Crossing Foundations.
Crossing Signals.
Crossings, Track.
Crushers, Rock.
Culverts.
Cutting Apparatus.
Curtains and Curtain Fixtures.
Derailing Devices.
Destination Signs.
Detective Service.
Dispatching Systems.
Door Operating Devices.
Doors and Door Fixtures.
Doors, Folding Vestibule.
Doors & Shutters, Fireproof.
Doors, Steel Rolling.
Draft Rigging.

Drills, Track.
Dryers, Sand.
Engineers, Consulting, Contracting and Operating.
Engines, Gas and Oil.
Engines, Steam.
Extension Platform Trap Doors.
Fare Boxes.
Fences, Woven Wire and Fence Posts.
Fenders and Wheel Guards.
Fibre Insulation.
Fibre and Fibre Tubing.
Field Coils.
Flooring Composition.
Forgings.
Friction Surfaces.
Frogs, Track.
Furnaces.
Fuses and Fuse Boxes.
Fuses, Refillable.
Gaskets.
Gas Producers.
Gates, Car.

Gages, Oil and Water.
Gear Blanks.
Gear Cases.
Gears and Pinions.
Generating Sets, Gas-Electric.
Generators.
Gongs.
Graphite.
Grinders and Grinding Supplies.
Guards, Trolley.
Harns, Trolley.
Headlights.
Headlining.
Heaters, Car (Electric).
Heaters, Car, Hot Air and Water.
Heaters, Car (Stove).
Hoists and Lifts.
Hose, Bridges.
Hydraulic Machinery.
Hydrogrounds.
Inspection.

Fuel & Labor Saving Issue

combined with the regular monthly

Mechanical Edition

—a triple-barrelled advertising opportunity such as has never before existed in the electric railway field. Aside from the intrinsic value of the timely information which this issue will bring its readers and the fact that this number will be used as an active reference volume for many months we also offer an

Extra Circulation of 1500 Copies

Total

8800

Advertisers, therefore, get both volume and value. In spite of the extra value thus offered, regular advertising rates apply. To make the most of this occasion, send copy or tell us to submit a suggestion.

First forms go to press March 8.

Wire at our expense to reserve a two-page spread or at least a full page.

Electric Railway Journal

Tenth Avenue at 36th Street

New York

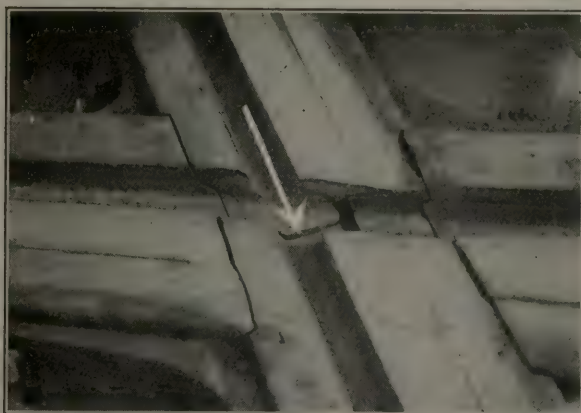
Member Audit Bureau of Circulations

Instruments, Measuring, Testing and Recording. Insulating Cloth, Paper and Tape. Insulations. Insulators. Insulator Pins. Insurance, Fire. Inventions, Developed and Perfected. Jacks. Joints, Rail. Journal Boxes. Junction Boxes. Laboratory. Lamp Guards and Fixtures. Lamps, Arc and Incandescent. Lamps, Signal and Marker. Lathes, Car Wheel. Lightning Regulators, Car. Lightning Arrestors. Lightning Protection. Line Material. Locomotives, Electric.

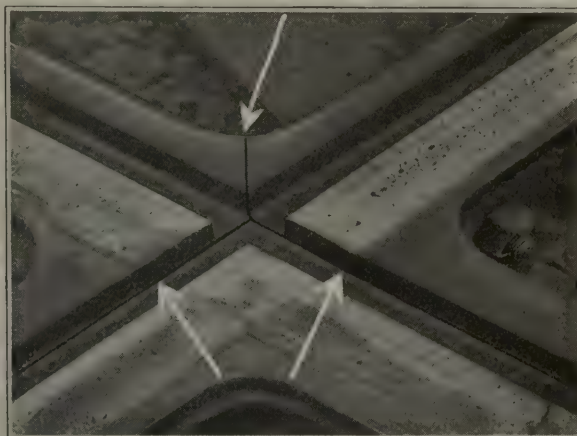
Lock Nuts. Lockers, Metal. Lubricants, Oil and Grease. Lubricating Engineers. Lumber. Machine Tools. Machine Work. Meters. Meters, Car, Watt-Hour. Mica. Mirrors for Motormen. Motormen's Seats. Motors, Electric. Motor Generation, Bonding and Welding. Motor Leads. Motor Trucks, Gasoline & Electric. Nuts and Bolts. Oils. Oxy-Acetylene. Packing. Packing Rings, Piston Head. Paints and Varnishes. (Insulating.)

Paints and Varnishes. (Preservative.) Paints and Varnishes for Woodwork. Paving Material. Paving Pitch. Pickups, Trolley Wire. Pinion Pullers. Pinions. Pins, Case Hardened, Wood and Iron. Pipe. Pipe Fittings. Planers. Pole Reinforcing. Poles and Ties, Treated. Poles, Metal Street. Poles, Ties, Posts, Piling and Lumber. Pole Sleeves. Poles, Trolley. Poles, Tubular Steel. Power Saving Devices. Pressure Regulators. Pumps.

Punches, Ticket. Punching Machinery. Rail Grinders. Rail Welding. Rails, Relaying. Rattan. Recorders, Power Saving. Registers and Fittings. Reinforcement, Concrete. Repair Shop Appliances. Repair Work. Replacers, Car. Resistance, Grid. Resistance, Wire and Tube. Retrievers, Trolley. Rheostats. Roofing, Building. Roofing, Car. Rubber Specialties of all kinds. Sand Blasts. Sanders, Track. Sash Fixtures, Car. Sash Metal, Car Window. Sash Operators. Scales, Weights, Balances and Dynamometers. Scrapers, Track. Seating Material. Seats, Car. Second-Hand Equipment. Shade Rollers. Shades, Vestibule. Shovels. Shovels, Power. Signal Systems, Block. Signals, Car Starting. Signals, Highway Crossing. Skylights, Steel Puttyless. Slack Adjusters. Sleet Wheels and Cutters. Snow-Plows, Sweepers and Brooms. Soaps. Soldering and Brazing Apparatus. Spikes. Splicing Compounds. Splicing Sleeves. Springs, Car & Truck. Sprinklers, Track & Road. Steps, Car. Stokers, Mechanical. Storage Batteries. Straps, Car, Sanitary. Structural Iron. Sub-Stations. Sub-Stations, Portable. Superheaters. Sweepers, Snow. Switch Stands. Switches, Track. Switches & Switchboards. Tampers, Tie. Tapes and Cloths. Telephones and Parts. Terminals, Cable. Testing Clips. Testing, Commercial & Electrical. Testing Instruments. Thermosats. Ticket Boxes. Ticket Choppers & Destroyers. Tickets & Transfers. Ties, Mechanical. Ties and Tie Rods, Steel. Ties, Wood Cross. Tools, Track & Miscellaneous. Torches, Acetylene. Towers & Transmission Structures. Tower Wagons and Auto-Trucks. Track, Special Work. Transfers. Transfer Issuing Machines. Transfer Tables. Transformers. Treads, Safety, Stairs, Car Step. Trolley Bases. Trolley Bases, Retrieving. Trolleys & Trolley Systems. Trolley Shoes. Trolley Wheels. Trucks, Car. Tubing, Steel. Turbines, Steam. Turbines, Water. Turnstiles. Vacuum Impregnation. Valves. Varnishes. Ventilators, Building. Ventilators, Car. Voltmeters. Washers. Weed Killer. Welders, Electric Arc. Welders, Portable Electric. Welding Processes and Apparatus. Wheel Guards. Wheel Presses. Wheels, Car, Cast Iron. Wheels, Car, Steel and Steel Tired. Wheels, Trolley. Whistles, Air. Window Operators. Wire Rope. Wires and Cables. Wood Preservatives. Woodworking Machinery.



What Happens to a Rolled Rail Crossing



Joints in Balkwill Articulated Cast Manganese Crossings are life savers. They positively prevent breakage at flangeway intersections, permitting 100% wear

Why Balkwill Articulated Cast Manganese Crossings Are Superior to Rolled Rail Crossings

This picture at the left shows where breaks in the main steel filling or backbone of rolled rail crossings are usually found.

These breaks are unavoidable because of the lack of flexibility of the rolled steel filler at the flangeway intersection.

In the Balkwill Articulated Cast-Manganese Crossing the difficulty is

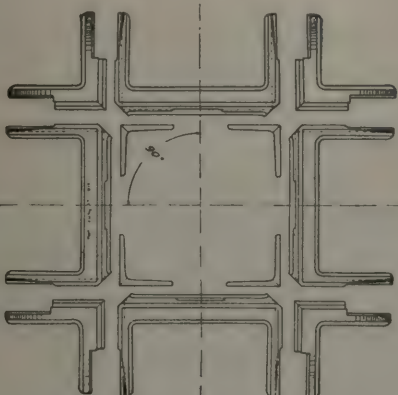
corrected by placing scientifically designed joints at the very places where breakage formerly occurred.

The lower first cost of a rolled rail crossing is therefore not a lower overall cost because it takes several rolled rail crossings to equal the life of one Balkwill Articulated Cast Manganese Crossing. Therefore the Balkwill Crossing is the cheapest in the long run. It gives

MORE WEAR PER DOLLAR THAN ANY OTHER CROSSING YOU CAN BUY

It saves interruptions to traffic, makes less demand on labor, which is now so scarce, and also reduces the cost of making replacements frequently.

Write us for data on existing installations. If your special work manufacturer cannot get prompt deliveries of manganese castings or has not taken out a license to manufacture these crossings, **DON'T ACCEPT A SUBSTITUTE** but write us direct and we will see that your requirements are taken care of.



Joints at the flangeway intersections of Balkwill Articulated Cast Manganese Crossings positively eliminate breakage

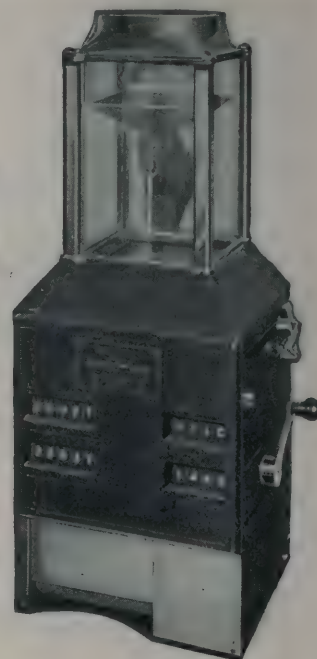
**Order Balkwill Articulated Cast Manganese Crossings
Direct from Your Special Work Manufacturers**

The Balkwill Manganese Crossing Co.

506 Williamson Building, Cleveland, Ohio



Why Mr. WILSON Favors Metal Tickets



Mr. J. H. Wilson, President Mobile Light & Railroad Company, when asked recently about the Johnson Metal Tickets used with the Johnson (Four-Cyclometer) Fare Boxes on his property, said:

"Metal tickets are much harder to counterfeit than paper tickets. Paper tickets could be counterfeited by the million very readily; but a metal ticket, especially of a design requiring a well-executed die, and also requiring access to a very heavy press, could not be counterfeited without considerable labor and expense. In the case of our tickets, where there are perforations, the die is very apt to be broken, so that the profit to the counterfeiter would be small as compared to paper. As a street car ticket is of no value except in the town where the system is located, there would not be much opportunity for disposing of them. Even though a counterfeiter made metal tickets, he would have to sell a very large number in order to make anything, and to dispose of them he would have to sell at a heavy discount which would, of course, make it very

probable that he would be apprehended.

"It is well to have a metal ticket of considerable cost, as compared to paper tickets, as the smaller profit reduces the liability of counterfeiting. Our tickets are of German silver."

The Johnson Metal Tickets referred to by Mr. Wilson are reproduced herewith.

Cash tickets are perforated to show the letter "M," employees' passes to show the letter "E," complimentary passes to show a Greek Cross.

Mr. Wilson says further that the percentage of slugs, counterfeits and non-current coins found in Mobile's Johnson Fare Boxes is trifling compared with the advantages.

Johnson Fare Boxes and Metal Tickets can simplify your fare problems, too.

JOHNSON FARE BOX COMPANY

Jackson Boulevard and Robey St., Chicago

50 East 42nd Street, New York

National Pneumatic Door and Step Control

On the
World's
Greatest
Highway

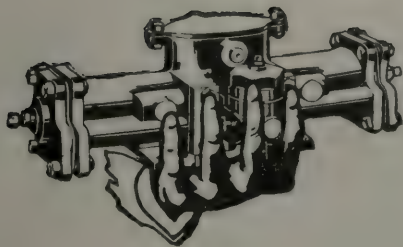


Who doesn't know Broadway and its famous stepless car?

Nowhere else in the world are surface cars operated for so long a stretch on such short headways.

Nor is there another thoroughfare in the world with so many short-haul riders—and consequently with so many stops per mile.

For such supremely severe conditions the New York Railways use exclusively the National Pneumatic door and step control of this company.



NATIONAL PNEUMATIC COMPANY

50 Church St. New York



515 Laflin St. Chicago

It Does More Than Merely Encourage Coasting—It Develops the Best Car Operation



Showing recorder location on one of the cars of the Connecticut Company

Any device which will aid in educating motormen to run cars on schedule with the least use of current is of course extremely valuable from the standpoint of economy alone. But the great value of the

Arthur Power-Saving Recorder

is not only that it attains this desirable result but also forces the motorman to observe the rules of best practice if he wants to have this device show a good record of his work.

For example, you want your men to report promptly any defect in car equipment so that it may be remedied with the least expense and also to insure against accident liable to occur from such defects if they are permitted to "run along."

The motorman who is endeavoring to make a good record on the Arthur Recorder will be certain to make such reports

promptly because if there is anything wrong with the car equipment it makes it harder *for him* to show the record he is after.

Again, you want your men to eliminate unnecessary stops and slowdowns and thus decrease wear on brake shoes and wheel tires. You want them to make smooth starts and stops. You want them to avoid spurts of high speed.

And these results are just samples of what the Arthur Recorder accomplishes *besides* reducing energy consumption.

Ask us for the whole story.

"Power wasted is the true measure of the motormen's relative efficiency"

The Arthur Power-Saving Recorder Co.
New Haven, Conn.

THE users of the Davis One-Wear Manganese Steel Wheel are those who have made the closest study and who have the facts upon their wheel operating and maintenance costs. High mileage capacity, safety and the elimination of re-turning of treads and flanges are important factors in Davis Steel Wheel Economy.

AMERICAN STEEL FOUNDRIES
1100 McCormick Building Chicago



DAVIS STEEL WHEELS

Have it sent to your home Why?

Electric Railway Journal's service is of permanent value

Every issue contains articles for which you may have no immediate use. You read them—they interest you—you store away their salient points in some crowded corner of your brain—and straightway forget them.

By and by occasions will arise

when you would give your head to be able to lay your hands quickly upon something you remember to have read in the Journal—not merely the high spots, but the detailed facts and figures.

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you will read it regularly, and what you want is always at your service. If it's the Company's copy you are reading, after that first hurried perusal it is gone for good.

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you must have your own individual copy—with no one else to share it with you or to mark or cut it up for you. You must have it sent to YOUR HOME, where you can have it all to yourself, where you can read it at your leisure, where you know where to find it when the hurry calls come for data of importance which you can get from no other source.

THIS YEAR

will witness many strides toward the permanent settlement of many of the burning questions now agitating the industry. These developments will leave their mark upon the common practice for years to come. You will want to refer to them repeatedly long after the present transition period is over. Beginnings are always interesting. The beginnings of many of the movements now in the bud are unusually so. They spell REVOLUTION all over—they forecast the entire reshaping of electric railway practice—many of their elements that now appear to be of minor import will hereafter be regarded of weighty consequence.

Get them all—get them for yourself

Get them permanently—get them at your home

TEAR OFF HERE

Electric Railway Journal, 10th Ave. at 36th St., New York, N. Y.

Enter my subscription for one year to the Electric Railway Journal and send me FREE an extra copy of the Annual Statistical and Better Service issue. I will remit \$3 in 30 days.

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will insure them to you in the way they will be of the greatest service to you. Never mind the money now—simply fill in and mail the coupon at once—

TODAY



The Water Front at Cincinnati, 1830

A Bouquet in One Hand—A Brick in the Other The Mayor of Cincinnati in 1868

sang the same old song about "high fares," "poor accommodations" and so on.

His refrain differed radically, however, from that of the present-day politician in that he gave the street railways credit for the enormous influence they exert in speeding up the growth of a city and the enhancement of its property values.

This was what Mayor Wilstach of Cincinnati said in his annual message of 1868:

"All great enterprises have their opponents. Why it is so, it is often hard to divine, but we in Cincinnati have already been treated to many instances of this kind. All recollect with what pertinacity the street railroads were opposed. Grave arguments were

advanced that their adoption would ruin business, that the streets, along which the track was laid would be so obstructed that it would be an utter impossibility to transact the business of the city, etc. What have been the results? Property, instead of decreasing, has steadily enhanced in value. The city, indeed, has been largely built up by their influence. The entire West End in fact owes its solid blocks, its palatial private residences, its park, skating rink and ponds, and its baseball grounds to the facilities of *getting to them* afforded by the 'people's carriages.' So will it be with the suburbs of the city, to which these roads are fast being extended. In short, the people could not well do without them, now, *notwithstanding their accommodations, high fares, etc.*"*

Mayor Wilstach had largely the right idea. The street railroads have been, and still are, an important factor in the progress of cities, supplemented in their service and their work by

Galena Oils

and Galena service, which help them solve their lubrication problems in the same effective manner as the railroads solve the transportation problems of the cities.

*The italics are ours.

Galena-Signal Oil Co.

Franklin, Pa.



SKF

on "the World's Greatest Electrification"

IN selecting equipment for the C., M. & St. P. electric locomotives it was required that all parts should operate successfully under blistering summer heat as well as in 40 degrees below zero weather.

It is significant that the General Electric Company selected self-aligning ball bearings marked SKF for the control motor generator sets.

The operation of this installation is an index of the service these bearings will give on the less difficult work of street railway motors.

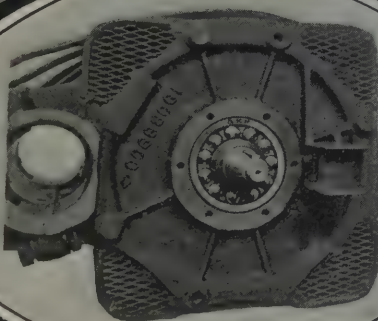
SKF BALL BEARING CO.

HARTFORD

323

CONN.

Left:
G E No. 258
Railway Motor
S K F Equipped



Right:
Motor Generator
Set showing the S K F
Ball Bearing



The Massachusetts Public Service Commission Says, in a recent report:

"An engineering and operating survey is very desirable and ought to be made by the railway. This should furnish full information as to be made by the railway. This changes in rolling stock—use of POWER BY MOTORMEN; routing of cars; layovers, etc."

Write now for your copy of the Rico booklet on

Traffic Surveys

And so anticipate the suggestions of your public utility regulators.



Rico Coasting Recorders



Time is the Essence of Railroading

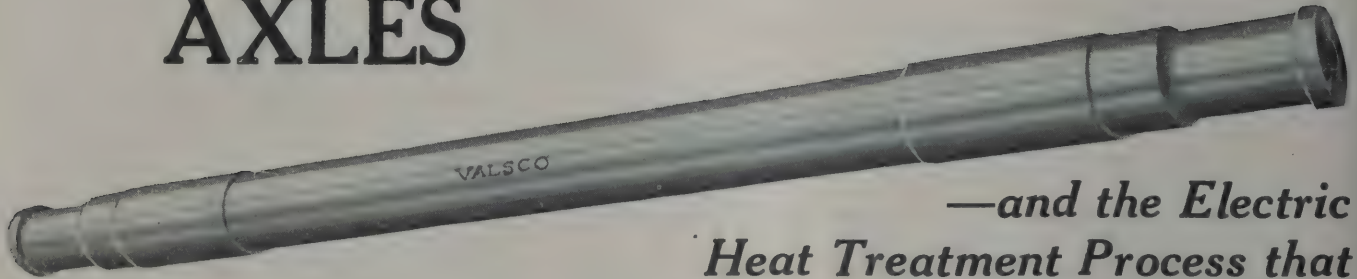
RAILWAY IMPROVEMENT CO.



61 BROADWAY, NEW YORK

"Electroheat"

AXLES



*—and the Electric
Heat Treatment Process that
insures manufacturing uniformity*

WHEN Laclede Steel engineers applied the electric furnace to the heat treatment of steel axles they more than produced a good axle; they perfected a **process** that insures **uniformity**, and good axles in unlimited quantity.

During the annealing or quenching and tempering of "Electroheat" Axles the heat is absorbed by the steel through radiation, rather than forced into it through contact with sharp flame. Overheating and uneven heating—old-time barriers to an evenly refined, thoroughly heat-

treated steel—are eliminated, because the electric furnace by its construction and perfect heat control, turns guesswork to scientific certainty!

That's why service failures due to breakage, bending and excessive journal wear are minimized in "Electroheat" Axles! That's why "Electroheat" Axles **have** to give better service and increased safety!

Note: "Electroheat" Armature Shafts possess the same torsional and shock-resisting qualities as "Electroheat" Axles, being heat treated by the same process. They minimize service breakdowns and maintenance costs.



"If Heat-Treated Electrically—It's a VALSCO"

LACLEDE STEEL COMPANY

General Offices: Federal Reserve Bank Building

ST. LOUIS, MO., U. S. A.

Speaking of Coal Prices



Five dollars bought this amount of
coal five years ago



Indicating
Recording Type
G-E Flow Meter

THE PRICE OF COAL

today is three times what it was five years ago. Because of this increase, methods are being sought in every power plant to keep fuel consumption as low as possible.

IN BOILER ROOMS

equipped with G-E Flow Meters it is known exactly what each individual boiler unit is doing; whether it is being fired efficiently or through some internal cause is not steaming properly.

THE MAXIMUM HEAT

value from your coal and maximum output can be secured by equipping your boiler with G-E Flow Meters.

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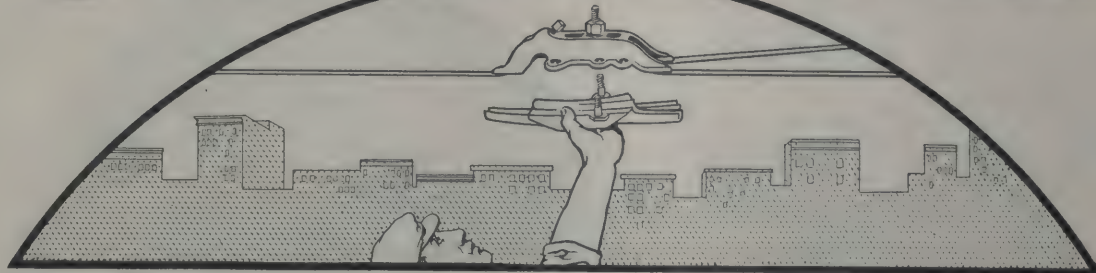
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*Southwest General Electric Company

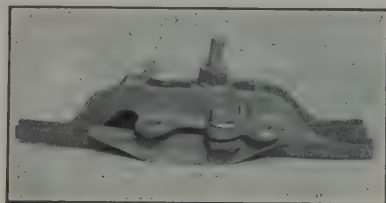
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"Just bolt it on"



The wear is on one part only—
A Renewal Pan which can be
replaced at one half the original
cost of frog.



Type N Frog (15°)

Cat. No. 200291—left hand
Cat. No. 200293—right hand
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No pull-up tackle is necessary
in making replacements.

The complete change-over
can be made in two minutes,
causing minimum interference
with schedules.

"A New Pan Makes a New Frog"

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Electric Railway Journal

Consolidation of STREET RAILWAY JOURNAL and ELECTRIC RAILWAY REVIEW

Volume 51

New York, Saturday, February 23, 1918

Number 8

The Journal Again Broadens the Scope of Its Service

NEARLY eleven years ago, or on April 4, 1908, we issued our first "Maintenance Number." Since then a special number, devoted to the problems of the engineering department, especially of the shopmen, has been published early each year. Our coming Annual Maintenance Number will be issued on March 16 and will also be a "Fuel and Labor-Saving Number."

The wide popularity of these issues has suggested a still further broadening of the field of this paper. Briefly, the plan contemplates the inclusion in one issue during every month of special articles devoted to the fundamental problems of the electric railway engineer in addition to the concentration of short or "kink" articles in one issue. The number this week is the first of these special monthly issues. It is expected that those which follow this will appear on the third Saturday of each month.

It is the purpose in these numbers to take up broad engineering questions in all electric railway departments rather than detailed accounts of individual installations. For this reason the program should appeal particularly to the ambitious younger men in the industry who wish to obtain first-hand an understanding of the fundamental principles in electric railway engineering. At the same time, it is hoped that the articles will appeal strongly also to the older and more experienced men in the industry who will take this occasion to refresh their memories on basic principles.

The publication of the articles outlined will not interfere in any way with the service now being given by the ELECTRIC RAILWAY JOURNAL to its subscribers. The articles mentioned are an addition to, not a substitution for, any part of the present service. We shall continue to publish promptly and in the first available issue all of the technical and other news of the week relating to the electric railway industry. The only difference will be that the "Equipment and Maintenance Department" will be given up as a weekly department.

Two Kinds of Master Mechanics—And Others

THIS paper has consistently advocated a more general recognition of the importance of the work of the men who design or maintain the track, power plant, overhead and rolling stock. We have insisted from time to time that these men are not paid enough, which is still true. Reasonable salaries must be paid if the electric railways are to retain men of the type which the mechanical and engineering departments must have.

If a competent man was required five years ago to supervise a shop, a power plant or a track department, a more competent one is required to-day. Adequate

recognition and compensation will help to retain good men and encourage them to develop themselves in their specialties.

But the management cannot do it all. The best service cannot be bought with money or even with recognition. There must be loyalty on the part of the employee—to himself, to the public, to his employer. This means that he must be keeping up with the times through study, through careful observation. He should thus not only be increasingly competent to do the work for which he is directly paid, but he should constantly be learning its relation to the whole organization. In the end the men who are not growing will eliminate themselves by the process of "natural selection."

Technical men—and others—divide themselves into two classes—those who work by rule-of-thumb and those who use their heads. It is high time that the latter class predominated. The hope of the industry for the future lies in the aggressive young men (and older ones if they are not becoming fossilized) who are using every means to make the most of themselves. Issues of the ELECTRIC RAILWAY JOURNAL like the present one are planned with these men in view.

Royaltyphobia or Aversion to All Payments for Inventions

THE symptom of Royaltyphobia in an electric railway man is a pronounced aversion to buying any article on which patent rights are enforceable. The victim strives desperately to find a "just as good," and as few mechanisms worth while are free to use, he falls back upon obsolete or discarded apparatus which can be made on a poundage basis. Curiously enough, the disease manifests itself only in connection with the victim's own business. He cheerfully pays the royalties that go into the cost of his Hanan shoes, his Stetson hat, his Rolls-Royce automobile, his Gillette razor, etc.; but he cannot see why Smithkin's beautifully balanced trolley wheels should cost more than the misshapen article that is making his trolley wire better known for pyrotechnic display than reliability of service.

Surely the inventor, like the laborer of old, is worthy of his hire. Royalty is simply reward for brains, skill and progressiveness. In the electric railway field the royalties charged are modest indeed when the cost of development, education and marketing an article is considered. We doubt if they usually exceed 5 per cent, and this charge, in comparison to the benefits conferred, is trifling in most cases. Yet regardless of this fact, so self-evident to those who know the manufacturer's sorrows and tribulations, there are still some operators so obsessed with the idea that inventors are little better than buccaneers that they might well adopt for their slogan: "Millions for the junk heap, but not one cent for brains."

It May Be a Patriotic Duty to Hold Conventions

WHEN the war broke out there was a general and commendable desire on the part of association managements temporarily to confine their activities to such as bore directly upon preparations for fighting. The result was a postponement of convention plans until the country had settled down to a steady and rapid pace in training its soldiers, sailors and airmen, and in producing and transporting the supplies needed by them. This time is now approaching.

It is generally conceded that the great world war is a war of engineering, especially of machinery and transportation. To make it most completely successful will require the perfect co-ordination of all contributing agencies. As utilities and manufacturers must somehow get together in their respective fields in order to discuss those questions which touch upon their relation to the war, it would seem to be the proper thing now gradually to resume the usual national and sectional gatherings. There should be no frivolity in connection with these; rather, a sober consideration of duty, of opportunity and of facility for the work in hand.

In holding its midwinter meeting in New York City last week the A. I. E. E. did that which was eminently fitting and patriotic. Much was made of the occasion for pressing home the lessons of the war preparations. There was nothing in the proceedings to offend the most sensitive patriotism. The same spirit evidently underlies the plans for the Central Electric Railway Association annual meeting to be held on Feb. 28 and March 1, the convention of the Southwestern Electrical and Gas Association, scheduled for April 15 and 16, and others which will be held soon. Such gatherings, with serious purpose and definite aim, cannot but contribute a share to the winning of the war.

Outside Traffic Expert Serves an Important Purpose

Traffic reports by outside experts have become quite the fashion during the last five years, but not all of them have produced an appreciable and early degree of relief. One of the chief reasons for this, perhaps, is the fact that the observers lacked operating experience. They were keen enough to see what was wrong, but not experienced enough to suggest practicable remedies. Sometimes, too, they fell into the error of assuming that all that was expected of them was an excoriation of the local railway from A to Z rather than constructive aid to the public.

Many reports by outside experts, however, have been really invaluable because they have directed attention to practical methods for ameliorating improper conditions. Sometimes such conditions have been due to the unprogressive policies of the railway; sometimes they have been due to financial limitations or to operating restrictions imposed by public representatives. In either case the report of the traffic expert has tended to create a better understanding of the existing conditions and to promote a desire for co-operation between city and company in improving them.

Thus to bring the two parties together is really the big function of the experienced traffic specialist. He sees the woods—the situation as a whole—because he

has not been dwelling among the trees. He is free from the ingrained traffic habits so often acquired in the course of years by the local operator and the local public, and he is not blinded by prejudice or by a desire to cater to special interests. Therefore, if he takes up his work in a spirit of true inquiry and co-operation, he makes it easy for the municipality and the railway to do together what they had never been able to accomplish alone.

Preparing for Changed Conditions in Interurban Passenger Traffic

INTERURBAN passenger earnings, while never fulfilling the roseate hopes of the early promoters, were nevertheless fairly uniform and dependable until the advent of the popular-priced automobile a few years ago. On the heels of this disturber of the rail peace of mind came the war, which indirectly acted as a traffic stimulus and thus made up in part the losses incident to automobile competition. The freight congestion resulting from the early foreign war orders, while throwing some local freight to the interurbans, only slightly affected passenger traffic conditions. Our own entrance into the great maelstrom of Mars, however, has produced more marked changes. Gigantic war preparations and at the same time the shipment of vast quantities of supplies to our allies so congested the traffic on the steam railroads, hedged in as they were by peace-time regulations and by the conditions set by competition, that the governmental control recently established seemed the only way out of an otherwise inextricable tangle.

From the evidence in hand there seems little doubt but that with the steam railroads so controlled very little consideration, perhaps some direct discouragement even, will be given by them to passenger traffic. Already many passenger trains have been removed from service, schedules have been slowed down and many of the luxuries of travel discarded. These things, vitally affecting passenger traffic on the steam roads as they do, are bound to have some influence on interurban passenger traffic. Local interurban passenger traffic should increase because of the abandonment of competing trains on steam roads and the general depreciation in the quality of steam road service. Likewise and for the same reasons through traffic on interurbans should increase.

The war in general and the fuel situation in particular have aroused the country at large, as nothing else could have done, to the necessity of efficient use of our "steel roads." From the psychological point of view the recent order of the Fuel Administrator, drastic as it may have seemed to some of the industries affected, was a godsend to the railways in that it brought before the people in a startling way their dependence on our transportation systems. Certainly the war is putting away many of the old petty jealousies and bursting asunder the shackles of tradition which have so long hampered many of our railways in their efforts to meet satisfactorily the transportation needs of our communities.

In the governmental control order the interurbans were specifically excepted. Whether such control is desirable to the users and owners of interurbans is beside the point in the present discussion. What the

interurbans must do is to keep their eyes open to opportunities for public service and increased earnings—for happily, in the long run, the two always go hand-in-hand. They, too, must seek to work their equipment to the limit of its safe capacity. As has previously been pointed out in these columns, the electric railway is particularly well adapted to the handling of a “gathering” and “distributing” type of traffic. Taking over local traffic, selling through tickets and checking through baggage over intersecting and even over paralleling steam roads, acting as nimble hands for the heavily loaded steam trunks, these are things that the interurbans can do and do well. The ideal from the standpoint of public service would be such co-operation as to make all of the railways, both steam and electric, one vast system, each member of the system doing the thing for which it is best fitted. By striving to attain this ideal the electric railways will be doing a patriotic service as well as increasing their earnings. Further, if for reasons of policy it would appear desirable at some time in the near future to place the electric railways under federal control also, much of the co-ordinating work would already have been accomplished and accomplished with a minimum of confusion to the users and of jeopardy to the owners.

Welfare Work Should Be

Sympathetic, Not Paternalistic

EMPLOYERS interested in welfare work may find stimulus for thought in an article in the current Monthly Review of the United States Bureau of Labor Statistics. While only fifteen electric railways are included in the 274 establishments which furnished the information on which this study was based, the conclusions are applicable to all. The article deals with the means taken by many of the companies for the entertainment or the mental stimulus, through lectures and club work, of employees outside of the working hours. Figures are given as to the number of establishments having social gatherings, lectures, moving pictures, auditoriums, musical clubs and outings. Each of these features of welfare work is considered from the information given by the various companies.

Reference is made to the fact that some employers have encountered discouragement through the feeling of certain employees that time “after hours” is their own and must not be “interfered with” by any company plans for amusement. There is also danger, as pointed out, that it is easy in this line of work for employers to assume a paternalistic attitude. For this reason many employers have left the development of recreational features to the employees themselves, with the understanding that proper efforts along these lines will be assisted and encouraged by the company.

Experience is a good teacher in such matters, as in all others. Splendid results have been secured from welfare work on certain electric railway properties which we have in mind. The better side of employees has been developed in a manner which must be encouraging to the men in charge. Nearly always such work brings about a helpful *esprit de corps*. It is well, however, for the employer who would undertake such work to guard against a development of paternalism, which may arouse a feeling of resentment worse than the first state.

Don't Neglect the Refinements in Turn-Back Service

NO EASIER way to squander money can be imagined than the use of ill-considered schedules by a street railway company. A thoughtful analysis of this fact was presented by Mr. Layng in the Jan. 5 issue of this paper. To weigh only one of the points made by this expert, it is worth while to take up the question of turn-back service. Nearly every manager has had experience with critics who believe every car on a given route should operate to the most remote terminus. Perhaps there are just as many who insist that additional cars should be turned back at this or that point to accommodate unusual crowds. Between the two contentions there is a solution which may satisfy neither faction, but would give the fairest apportionment of service. It is in the settlement of this point that the best operating skill will show itself.

As Mr. Layng stated in his article, “It is just as wrong to run too much mileage as too little mileage; in one case the hardship suffered by the company is reflected in its finances; in the other, the hardship borne by the public is reflected both in decreased earnings and in the increased dissatisfaction.” There are few lines on any system which call for 100 per cent through service. In fact, the longer a line is the more delays there are to be expected, thus affecting all intermediate points. On the other hand, not every heavy loading point is entitled to special turn-back service.

It is easy to exaggerate the importance of such requirements and thus deprive another district of its proper facilities. It must be remembered also that to switch back at a certain point entails discomfort and inconvenience to the passengers who must be unloaded, even though it accommodates a crowd waiting to travel in the opposite direction. This consideration shows the importance of correct destination signs on cars as well as the advisability of making known the existence of special service by advertising.

Efficient management calls for the placing of cars where and when they are most needed. There are various methods, of course, for determining such needs, and in the choice of the proper system good judgment will again assert itself. As Mr. Layng says, it is necessary to analyze the passenger loads on all cars at all hours of the day. This does not mean a mere reading of the register, which shows only the total passengers, or only the cash passengers, up to this or that point. Such figures would not show where the load had tapered off. There must be made an actual count or close estimate of passengers on the car at the various points designated. The selection of an “average” day from the two or three days’ survey will give the best index as to conditions.

The points of maximum demand having once been determined, the service must be proportioned accordingly, and the usual appeals from disgruntled passengers must not cause the operating official to change his schedule unless a new check shows that conditions warrant such action. Economical requirements of the present day call for careful thought on such features of operation as are touched on in the article referred to. No wide-awake manager will “take things for granted” nor overlook any possible opportunity to conserve or add to the revenues of his company.

What the Maintenance of Way Department Does

Good Maintenance of Way Is Necessary Not Only to Secure Maximum Life of Track and Structures, but Because the Upkeep Costs in Other Departments Depend Upon It

By R. C. Cram

Assistant Engineer Way and Structure Department
Brooklyn Rapid Transit System

THERE is no standard book on modern electric railway track construction and maintenance to which the young engineer or student can refer for information. There are handbooks which treat the subject in a rather formal way as a part of the general subject of electric railways, but none of them begins to tell the whole story. They lack the essential features of co-ordination and sufficient elaboration. Similarly, the steam railroad track maintenance field was not covered by a book devoted entirely to the subject until Willard's work on "Maintenance of Way and Structures" appeared in 1915.

The electric railway track, particularly that in streets, is intimately connected with the nature of rolling stock, vehicular traffic and street pavements. It is a fundamental part of the railway, and has a vital influence in the operating and maintenance cost of the road. The location of the tracks, largely in streets or highways, is responsible for the principal differences between electric railway track and steam railroad track, and contributes many details of construction and maintenance expenses which the steam road escapes.

The materials, appliances and methods used in electric railway track maintenance have entered upon a new phase, which began about 1908, principally as the result of extraordinary replacements required by much trackage reaching its wear limit. During the life of the electric railway the track has passed through a cycle which has attempted to follow the rapid changes in type and weight of rolling stock. It began with the light electrified horse car running on "tram" or stringer rails in cobble pavement. These were succeeded by the double-truck car whose weight steadily increased up to 35,000 or 40,000 lb., and the rails were changed to deep girder sections on ties in rough 8-in. granite or other block pavements. The recent tendency in rolling stock is in the nature of a return to the light-weight car, often of the single-truck type, and the track construction is returning to rails of less depth and sometimes of less weight. The pavement is tending toward the smooth types, such as asphalt and other bituminous pavements, 4-in. grouted granite, concrete and brick. Along with these changes in rolling stock and track, the

character of vehicles using the streets has been changing. The narrow steel-tired wagon wheel of the horse-drawn vehicle is being supplanted by the rubber-tired motor vehicle, with a consequent lessening of the destructive action upon track pavements.

In company with these developments, much attention has been directed toward the materials of construction, and there has been a crystallizing force at work in the track-maintenance organizations so that they are rapidly approaching quite similar lines of endeavor.

It is believed that the work as now conducted will admit of description, and in this attempt to co-ordinate available data an effort will be made to set forth the best accepted practice now current in that important branch of electric railway engineering which has come to be known as maintenance of way and structures. Advantage will be taken of the privileges enjoyed in co-operation with other maintenance engineers through joint service for several terms as a member of the committee on way matters of the American Electric Railway Engineering Association. The Engineering Manual and Proceedings of that association will be drawn upon frequently, as it is responsible in a large measure for the standards now existing in electric railway engineering practice.

The similarity which modern interurban and high-speed tracks have to steam-road tracks makes the work of the American Railway Engineering Association particularly valuable to electric railway engineers, and the material from its proceedings as co-ordinated in Willard's work on "Maintenance of Way and Structures" will be used as occasion warrants. The valuable reports of the Board of Supervising Engineers, Chicago Traction, will also be consulted freely, since the reports cover many original investigations made in conjunction with the practical reconstruction of the entire surface railway system in Chicago, now about finished.

The work of others, and of periodicals, societies and associations, will also be credited where credit is due.

Maintenance of Electric Railway Track Is a Big Task

In round numbers there were 50,000 miles of single track operated by 1029 electric railway companies in the United States on June 30, 1917. This mileage is about 12 per cent of the steam-railroad mileage as of January, 1918, and is greater by about 9000 miles than the entire steam-road mileage of the Dominion of Canada in 1914. The electric railway trackage in operation would provide a double-track railroad around the earth at the equator. About 300,000 people were employed in operating and maintaining electric railways in the United States in 1917.

The upkeep of 50,000 miles of electric railway track, about 60 per cent of which is in densely populated areas within cities or towns (which means that this trackage

(Concluded from page 356)

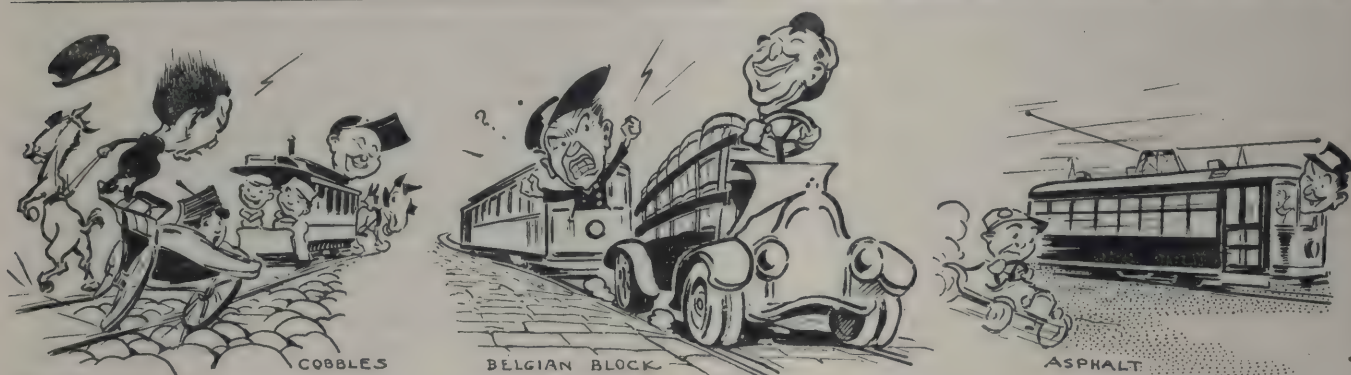
obtained by the use of recording instruments. However, these suggestions presuppose that such instruments are not available, or that the time and expense of conducting a more elaborate test is not warranted. After the data cards for each trip are turned in they are summarized and the results thus secured are entered on the traffic data record as shown in an illustration on the preceding page.

is generally well paved) presents a problem worthy of the best engineering talent. The work involved is so full of detail as compared with steam-railroad maintenance work, that the force required by the electric railways could probably maintain more than twice as much mileage if employed in steam-road service. In common with the latter service, the work is termed "Maintenance of Way and Structures" or sometimes simply "Maintenance of Way." Its importance is indicated by the records, which show that about 16 per cent of the total operating expense is on maintenance of way and structures. The track is the basis part of an electric railway property, and because of its usual location in streets its maintenance must require a high order of skill, judgment and executive ability, and often considerable diplomacy, particularly in dealings with numerous civic authorities. Organization also plays a big part in the successful conduct of the work.

It should be remembered, as Willard has well said,

much work should be completed before the heavy rush of midsummer business. The fact that cars must be operated and service maintained, with the necessary maintenance of equipment and operation of power plants, makes it plain as to why the way department must suffer first in consequence of any policy of economy. Such economies, however, are expensive in the end, as the usual result is a heavier proportionate expense later. Combined with this are increased expenses in maintenance of equipment, overhead line and transportation. These follow because track deteriorates rapidly if not well maintained, and rough track, bad joints and poor bonding soon cause excessive damage to equipment, extraordinary side wear on trolley wire, increased power consumption, and even the reduction of car speed in sufficient amount to require more cars to operate the line.

There is little doubt that the hitherto prevailing time for closing the financial year coming in June, as



PAVING HAS A VITAL RELATION TO TRANSPORTATION PROBLEMS

that "two important facts should be understood, viz.: (1) The large proportion of the operating expense which is expended in track and pavement maintenance; (2) the relation existing between the kind, location and condition of the track and the economical operation and business of the road." (The italics are the writer's.)

The track, pavement and roadbed represent the greater part of the investment in such roads, as a rule, yet the maintenance of this part of the property as a branch of engineering has not been recognized until recently as being of any particular degree of importance.

In line with steam road history, the work in the past was often in the hands of the practical man who had worked up from the ranks. In recent years, the necessity for the proper recognition of the importance of the work has been more and more apparent, so that to-day quite a number of roads have cadet engineers in training for the work, and we now generally have the engineer of maintenance of way replacing the old-time roadmaster or general foreman.

The tendency of electric railway managements to disregard the recommendations of the way department is perhaps not so pronounced as it is in steam-road practice. Nevertheless, when it seems necessary to reduce expenses the way department is generally the first one to receive the axe of retrenchment, and usually at a time when the performance of the work could be done most economically.

This is particularly true of the spring season, when

it has for a long period, has been responsible for the enforcement of retrenchment policies during the best part of the working season. However, the movement is gaining headway, and has been sanctioned by the various regulatory bodies which provides for an agreement between the financial year and the calendar year. The effect of this change will be appreciated by all having charge of maintenance-of-way matters.

It is believed that most managements now realize the importance of two basic principles: (1) The need for continued minor repairs and renewals to keep the track and pavement up to some fixed standard to offset normal wear and tear or depreciation; and (2) the need for a certain minimum amount of reconstruction or extraordinary maintenance to keep up a reasonable balance between traffic increases and increased loading or excessive wear on some portions of the system.

Improvements That Are Suggested by the Way Engineer

It is clearly the duty of the way engineer to point out to the management such improvements in tracks and structures as conditions may suggest, and from time to time to make requests for appropriations of funds to carry out the work desired. It is also his duty to make the best possible use of the moneys assigned for such improvements. He must, in addition, be prepared to furnish plans and estimates for the various improvements, additions and betterments which are

TABLE I—SUMMARY OF THE PRIMARY CONSTRUCTION COSTS FOR A PROPOSED ELECTRIC RAILWAY (FISCHER)*

Accounts	Cost per Mile of Track	
	Minimum	Maximum
1—Engineering and superintendence.....	\$1,000	\$2,000
2—Right-of-way	2,000	4,000
3—Other land used in electric railway operations	100	500
4—Grading	2,500	6,000
5—Ballast	1,500	4,500
6—Ties	1,820	2,600
7—Rails, rail fastenings and joints.....	3,700	4,200
8—Special work	400	600
9—Underground construction .....	.....	.....
10—Paving .....	.....	.....
11—Track laying and surfacing.....	800	1,200
12—Roadway tools	50	50
13—Tunnels .....	.....	.....
14—Elevated structures and foundations.....	.....	.....
15—Bridges, trestles and culverts.....	2,000	4,000
16—Crossing, fences, cattle-guards and signs.....	500	1,000
17—Interlocking and other signal apparatus.....	.....	2,500
18—Telegraph and telephone lines.....	100	500
19—Poles and fixtures.....	500	1,500
20—Underground conduits .....	.....	.....
21—Transmission system	500	1,200
22—Distribution system	1,500	5,000
23—Dams, canals and pipe lines.....	.....	.....
24—Power-plant buildings	600	1,200
25—Substation buildings	300	500
26—General office building .....	.....	.....
27—Shops and carhouses.....	400	600
28—Stations, waiting rooms and miscellaneous buildings	100	200
29—Docks and wharves.....	.....	.....
30—Power-plant equipment	2,000	4,500
31—Substation equipment	750	1,500
32—Shop equipment	150	300
33—Park and resort property.....	.....	.....
34—Cost of road purchased.....	.....	.....
35—Cars	800	2,600
36—Locomotives .....	.....	.....
37—Electric equipment of cars.....	600	1,600
38—Other rail equipment.....	200	500
39—Miscellaneous equipment .....	.....	.....
40—Law expenses	200	500
41—Interest	1,000	2,000
42—Injuries and damages.....	100	200
43—Taxes	50	100
44—Miscellaneous	500	1,000
Total.....	\$26,720	\$58,650

*See article by L. E. Fischer, on "Estimating Operating Expense and Cost of Construction," ELECTRIC RAILWAY JOURNAL, Sept. 6, 1913, page 387.

constantly being brought forward by the operating officials. These projects take the form of suggestions for double tracking, changes in special trackwork for re-routing of cars, construction of additional sidings and turnouts on single-track roads, and sometimes grade reductions and changes in alignment. The betterment and changes in bridges and other structures are also items which require a great deal of attention, with the view of securing all possible economies in maintenance charges. There are many municipal and state projects which require the engineer's most careful attention because of the necessity for co-operation with public authorities in connection with public improvements. It is not the purpose of these articles to discuss these improvements, except to point out occasionally how neglect of consideration of the maintenance point of view, when improvements and construction work are being planned, may ultimately provide excessive charges for maintenance.

Maintenance Never Stops

The construction of an electric railway is naturally of first importance, but once the road is finished its maintenance begins. The construction period is comparatively short, while the maintenance period never ceases unless the road is abandoned. Consequently the work of the maintenance-of-way department may be said to assume first importance so soon as the construction department ceases its activities. This is particularly true in electric railway work, because new construction is and has been almost at a standstill for the last five years at least, and what little construction work has been done has usually been carried out by

the engineer of maintenance of way, acting through a specially assigned construction engineer. In times of stress, construction work can be stopped entirely for comparatively long periods, but a reasonable amount of maintenance must go on so long as the road is in operation.

In common with steam roads, the proportion of maintenance expense to total operating expense is high. This has been assigned to the fact that, like the early steam roads, the electric railways were originally built rapidly, and often in undeveloped territory. They were also built with the view to cheapness in first cost rather than to economy in future maintenance. Furthermore, quite a long period of time was required for inherent defects in early construction to develop, and much trackage was built with these inadequate early types as patterns before the defects of such types could be determined. There was also a long period of constant and rapid increase in car weights and traffic, which finally reached the point where the track construction was really not strong enough to sustain the loading. Under these conditions it is to be expected that the maintenance costs would mount to high figures.

No Common Standard of Track Classification

The steam roads have adopted classifications of track construction which correspond to certain predetermined amounts of traffic and varying numbers of main tracks, and their standards of track construction and maintenance are based upon the classifications adopted by the American Railway Engineering Association, which are as follows:

Class A Track.—All districts of a railway having more than one main track. Also all single-track districts where the traffic equals or exceeds a freight-car mileage of 150,000 per mile per year; or a passenger-car mileage of 10,000 per mile per year and a maximum passenger-train speed of 50 m.p.h.

Class B Track.—All single-track districts of a railway where the traffic is less than for Class A, and is equal to or exceeds a freight-car mileage of 50,000 per mile per year; or a passenger-car mileage of 5000 per mile per year and a maximum passenger-train speed of 40 m.p.h.

Class C Track.—All districts of a railway not meeting the traffic requirements of Classes A or B.

The modern interurban and high-speed electric railway construction, however, often meets and at times exceeds the requirements of Classes B and C in all respects except freight traffic, but there are no standard track classifications of this kind in the electric railway field. On the other hand, the electric railway is generally found to have only one fixed standard for its new construction or reconstruction in any one city or system covering a wide variation in traffic and disregarding the number of tracks. This applies to the interurban and other high-speed electric railways as well. It must not be understood that all the electric railway tracks on any one system or in any one city are alike. Far from it, because most properties of any considerable size are consolidations made up of different types of construction, which were perhaps selected by as many managements as there were companies. But it will be found that each system now has a fixed standard for city track and another for track on private way, and

the attempt is being made to get the trackage rebuilt to only one or two general types for the system. This practice has both advantages and disadvantages, but the fundamental principles in back of it are sound, as they are based on many economies in materials and labor which accompany the use of only one or two standard types of construction.

What Does Electric Railway Track Cost?

Electric railway track construction costs are subject to many variable conditions which will increase or decrease the cost over a wide range. There are at least five distinct types of roads, which in turn call for as many distinct differences in cost. These types are: (1) Urban or city lines; (2) interurban or suburban lines; (3) high-speed lines operated by means of third-rail or high voltage d.c. and a.c. overhead trolley wires; (4) elevated railways, and, (5) subways. There is also a variation in strictly urban line costs, in New York and Washington, for instance, where the very expensive underground trolley system of operation is in use. Furthermore, the variation in character of country traversed and in cost of materials and labor in different parts of the country has considerable influence on costs.

Another factor which has a decided effect on the cost of urban or city lines is track pavement, which may vary as much as \$10,000 per mile of track on lines similar in all other construction details, but situated in different cities, in one of which the paving requirements may call for a more expensive type of pavement than in the other.

In addition to these items, there are the variations in construction costs caused by the nature and extent of storage yards, terminal facilities at fair grounds, ferries, baseball parks and other places where large crowds of people congregate, and the important factor of special track work contributes cost variations which differ widely.

It is obvious that there can be no fixed rule governing the construction cost of electric railways, but it may be stated in a general way that, according to estimates by L. E. Fischer, the modern interurban road costs complete anywhere from \$26,720 to \$58,650 per mile of track (see Table I), and that the cost of right-of-way, tracks, bridges, signals and incidental structures, other than overhead work, will range from \$16,140 to \$32,710 per mile of track (see Tables I and II). These estimated figures were for 1913, and were based on an analysis of costs for ten interurban roads.

Tracks on lines located entirely in cities or towns, and requiring pavement, will range in cost from \$20,000 to \$45,000 per mile of track. The latter figure is taken from actual costs of a 6-mile extension built in 1917 in a large Eastern city, while the former covers a 2-mile construction job done in 1914 in an Ohio town.

The construction costs for tracks on high-speed lines, elevated roads and subways are usually equal to the costs for first-class steam road tracks.

There is a great deal of money spent on track maintenance for which there is no improvement in permanent value. Tracks on private way are continually re-surfaced and re-aligned; rails and ties are renewed here and there and joints tightened up. In paved tracks, joint and rail repairs are more costly because of

TABLE II—ESTIMATED TRACK AND ROADWAY COSTS OF A PROPOSED ELECTRIC INTERURBAN RAILWAY, BEING A SUMMARY OF CERTAIN ESSENTIAL ITEMS TAKEN FROM TABLE I WITH 5 PER CENT FOR ENGINEERING ADDED

Accounts	Cost per Mile of Track	
	Minimum	Maximum
1—Engineering and superintendence.....	\$770	\$1,560
2—Right of way.....	2,000	4,000
3—Other land used in electric railway operations	100	500
4—Grading	2,500	6,000
5—Ballast	1,500	4,500
6—Ties	1,820	2,600
7—Rails, rail fastenings and joints.....	3,700	4,200
8—Special work	400	600
9—Underground construction .....	.....	.....
10—Paving .....	.....	.....
11—Track laying and surfacing.....	800	1,200
12—Roadway tools	50	50
13—Tunnels .....	.....	.....
14—Elevated structures and foundations.....	.....	.....
15—Bridges, trestles and culverts.....	2,000	4,000
16—Crossings, fences, cattle guards and signs.....	500	1,000
17—Interlocking and other signal apparatus.....	.....	2,500
	\$16,140	\$32,710

(Note: Track bonding is omitted because it is classified as a part of the distribution system.) From article by L. E. Fischer, ELECTRIC RAILWAY JOURNAL, Sept. 6, 1913.

the incidental removal and restoration of the pavement. It is a well-known fact that pavement maintenance represents from 30 to 40 per cent of the total maintenance cost for tracks in paved streets. These details require careful consideration from an economic standpoint and it will often be found that large expenditures on radical improvements will result in great and continued economies in maintenance. There should be a constant effort to keep the condition of the track up to such a degree of efficiency that a proper relation between the track condition and car traffic will be maintained since the deterioration of the tracks, if allowed to go too far, will have a marked influence on costs of car operation and maintenance of equipment.

The degree of track efficiency which is desirable is dependent to a large degree upon the general condition and age of all the trackage and the financial position of the road. It is obvious that a road of poor earning power can hardly afford the standard of maintenance expense which would obtain upon a road which has an ample income.

Track maintenance costs, like track construction costs, are subject to many factors which control the expenditures. As an indication of how the cost of maintenance may vary it may be stated that an examination¹ of the expense for maintenance of way and structures on ten interurban roads in 1913 indicated a range of from \$800 to \$1,000 per mile of track operated. This range compares closely with the costs covering the electric railways in the State of Connecticut in 1912, as found in the annual report of the Connecticut Public Utilities Commission. The cost of this item on urban roads will range from \$1,000 to \$2,000 per mile of track operated, being influenced greatly by the amount of reconstruction done in any one season, for the reason that the greater part of the cost of reconstruction work is really extraordinary maintenance and is charged to regular maintenance accounts. These figures are more interesting when it is stated that in 1913 it cost, on an average for all main tracks on steam roads, about \$1,300 per year to maintain 1 mile.²

The maintenance expenditure for track and pavement on 100 miles of modern 7-in. girder rail track in Brooklyn, N. Y., having wood ties and grouted granite pavement on concrete and covering tracks from one to ten

¹L. E. Fischer, ELECTRIC RAILWAY JOURNAL, Sept. 6, 1913
²Willard: "Maintenance of Way and Structures."

Electric Railway Power Plant and Its Personnel

**The Technically Trained Man
Must Be Held in the Power
Plant, and Particularly in the
Boiler Room—He Can Be Held
If the Management Realizes
What Economies Can Be Car-
ried Out by Men of Scientific
Training**

By Hartley LeH. Smith

Engineer of Tests
Brooklyn Rapid Transit System

THE power supply of an electric railway comes either from an electric power plant devoted exclusively to the individual railway's use or from a power plant carrying railway load as a part only of its total load, the remainder being lighting load and industrial power load for manufacturing purposes. While slightly more than one-half of the electric railways today get their power from plants devoted exclusively to their own use, and in fact owned and operated by them, the tendency is very rapidly growing to forgo exclusive power supply and purchase from a power company.

The forms in which electric power is generated for electric railway use are direct current at 550 to 650 volts, direct current at 1200 volts, direct current at 2400 volts, alternating current, three-phase at high voltage with substation transformation, and alternating current high voltage single-phase with distribution to the overhead contact system without transformation. The single-phase distribution just mentioned is in reality single phase distribution from three-phase generators in practically all cases to-day.

Generation of three-phase current in this country is at 25 cycles or at 60 cycles per second. Other frequencies are so rare as to be altogether negligible. This is by no means true in other countries. In England, for instance, there are four or five frequencies in common use.

Until very recently alternating current for railway

(Concluded from page 360)

years old with an average age of nearly four years, was found to be \$460 per mile per year.³

It was also found that the expense for joint maintenance represented 52.1 per cent, pavement 34.8 per cent, and corrugation 12.8 per cent of the total maintenance expenditure. Incidentally it was noted that about 26 per cent of the pavement expense was for repairs to pavement following joint repairs, and also that 65 per cent of the total expense was confined to 11.4 per cent of the mileage, having been due mainly to a particular type of rail joint.

It will be apparent from the foregoing figures on maintenance costs that the engineer of maintenance of way needs to keep closely in touch with the expenditures of his department. Through careful analysis of expense and comparison with similar items on other roads as well as comparisons of different parts of his own road, he may search out the weak points and take steps to overcome them.

use, whether transmitted to converter substations or distributed to high-voltage, single-phase trolleys, was invariably generated at 25 cycles. Lately, however, the 60-cycle, 550 to 650-volt railway converter has been developed and large amounts of power are now being generated at 60 cycles and transformed to direct current for railway motor use. It is indeed the 60-cycle railway converter operating at 550 to 650 volts which is making possible the movement away from exclusive railway power generation, and the substitution for it of power purchased from the general power company. The general power company generates at 60 cycles, since its load has been lighting and industrial power, and 60 cycles alone is a frequency suitable for lighting. Stations generating at 25 cycles are therefore either those devoted to electric railway load or they are stations situated in those very large cities where the congestion is so great as to make feasible the entire transformation to direct current form before distribution of light and power to consumer's circuits.

An Efficient Plant Is a Specialized Plant

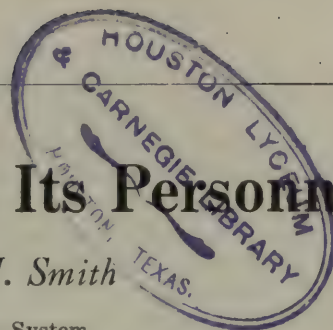
So much for alternating-current generation and distribution. Of the forms of direct-current power, those at 550 to 650 volts, 1200 volts and 2400 volts, it may be said that they are generated in power plants devoted exclusively to railway use, the amounts of such power sold as a general supply for industrial purposes being so slight as to be quite negligible.

Classifications of course cannot be made too rigid. There are, for instance, very many electric power plants in this country with entirely distinct groups of generators devoted to the specific purposes for which they are exclusively fitted. Such plants constitute, so to speak, two or more generating stations under one roof; they are not typical of modern practice. They are examples neither of the specialization which spells economy, nor of the well nigh universal adaptability of the extremely modern stations which also spells economy.

Direct One-Man Management Is Rare

Of the organization of the personnel of electric power plants it may be said that there is very wide variation when considered in any detail; standardization of such organization even along very general lines has as yet by no means come. It is doubtful whether any distinction could be substantiated between the organization of personnel in railway power stations and that in others. One very broad and significant generalization can however be made; the division by a sharp line between electrical and steam (engine and boiler room) responsibility. The four walls of a power station but rarely house an official fully responsible for both classes of

³See ELECTRIC RAILWAY JOURNAL, March 17, 1917.



apparatus and service. Of course responsibility for these two cardinal services merge always somewhere in the company organization in one man. Very nearly always, however, he is a man stationed among the other company executives. In all but really large companies, where complexity and differentiation of organization naturally multiply, he is almost sure to bear other executive responsibility also. Very often he bears very many other responsibilities, as general manager. Very often, too, in companies somewhat larger he is electrical engineer and is in charge of electrical distribution and often indeed of rolling stock also, although this last is certainly less common than formerly. Really large companies organize quite differently, with much specialization as size increases.

As for companies of average size, and even much less than average size, so sharp a distinction runs between immediate first-hand charge of steam and electric operation and maintenance control there is no answer but one. Men considered capable of ambidextrously handling both are scarce. The thin ranks of such men are growing nevertheless visibly larger. Why so? Well, it is a fact that the boys from the technical schools of fifteen years ago are boys no longer now.

An electric power station has its chief engineer; it has also its chief electrician. These are not responsible one to the other. That is the point I have been making; responsibility merges above. A consequence is that chief engineer and chief electrician have their own separate organizations. It is largely so that this dualistic responsibility perpetuates itself. Power stations are manned largely by men who grow up in power stations. A man grows up as a steam man or as an electrical man. After a while he gets to the top of the steam or of the electrical department. Do I know that the water tender in the boiler room reads in his technical paper the circuit connections of a three-phase generator? I do know it. I am not writing of the power station a bit in the future but of the present-day power station.

Organization Varies with Plant Characteristics

Of the detailed organization inside an electric power plant no standardized scheme can be drawn up. Certain very broad distinctions are however fairly clear. In all but very small plants there are electrical operators and electrical maintenance men. Rarely do electrical operators do repair work. On the steam side, however, a watch engineer and a monkey wrench are much together; likewise a boiler room engineer and a tube cleaner. In quite large power stations it is true there is apt to be considerable distinction between plant operation and maintenance with sometimes an assistant chief engineer responsible for maintenance under the chief engineer, while the watch engineers, operating men, remain responsible directly to the chief engineer.

A very important phase of the steam plant organization bears upon the relationship between engine or turbine-room force and the boiler-room force. At one end of the scale, that of the small plant, there is the engineer and the fireman or firemen, with nothing dubious as to who gives and who takes orders. But at the other end of the scale, the very large plant, the question of unity or cleavage of organization is sometimes decided

one way, sometimes another. The question is whether the chief engineer deals directly with the boiler-room force or more or less through the ranking man or men of the engine room. Very rarely probably does the engine-room man find himself unconcerned with certain features of boiler-room operating practice, such as banking and starting up of boilers to suit the changing number of engine-room units in operation, the maintenance of uniform steam pressure, etc. Very often, however, no engine-room man is held in any way responsible for boiler repair work.

A vast deal is written nowadays about the superior significance of talent, real engineering talent, in the boiler room; that it is in the boiler room that plant economy is made or lost. We are told that in the boiler room is the opportunity for the big operating man; that there a man's work from hour to hour is worth amounts of money to his company so vast compared with his pay that his pay might be anything at all. We are told also



"Our job is to make this pile go farther"

that the increasing, very rapidly increasing, introduction of individual boiler units of very great size is rapidly putting this claim upon the basis of actual practice. We are told that the really technical man is demanded; that this company or that company is going after graduates of engineering schools of rank and that in the boiler room such young men will do the thing as it should be done. This sounds well. The scheme is grounded in very excellent logic; but does it really work? Would such men stay, and if they stayed would they do what is expected of them? In the first place there are a lot of things a technical man, a technical graduate, doesn't know. He knows boiler operation, or if he doesn't he learns it very quickly and well. But maintenance he doesn't understand because a whole lot of it consists of "tricks"; in other words, it is a trade. He can learn that, too, but life is short and the American technical graduate rises all too quickly to wait for that. Before you can very well get track of some of them you find that they are running power stations themselves. If that is so they must bluff it just a bit for a while, you say? Well, yes, but then we said above that they are Americans, did we not?

Technical Men the Hope of the Boiler Room

What then is the hope of the boiler room? I really think it awaits the day of the thoroughly technical chief engineer. That day hasn't come, but it is coming. If a man knows the field intimately at present he knows that the full advent of the day is distant even yet. And the reason for this is simple, it will not be here until the older men have left the field. Even that will not be enough; men must be graduated in larger numbers than at present, and a greater proportion of those graduated must continue working as engineers. The young fellows who are in power stations now in capacities more or less vague and nondescript, and there are many of these but many more are needed, must stay and grow up and find themselves eventually in charge by a sort of inevitable inheritance. Then, too, certain fast-vanishing prejudices which now exist must be banished forever.

And when the day comes when power plants, in

practically all cases, are in charge of trained technical men, will economy have improved and if so how will it have been improved? After all, the technique of power station operation is not of great complexity. Compared with a scientist's field the day's work of a power plant engineer may be arduous, but it is not complex. Indeed, its very simplicity is a handicap, for it can hardly attract the ablest men. Scarcely any of the essentially technical features of power generation are entirely outside the knowledge of men operating power stations to-day. They have heard of them at least, although their grasp upon the underlying principles may not be of the firmest. The chief difference is that in that future day the men running power stations, technically trained men, will more truly believe in these principles. They will believe them to be more worth while; they will believe them to be more practical. Then, too, we must not forget that their task of execution will be easier. If the chief takes to knowledge and "drinks" it, what will the "boys" be doing?

Station Duties Differentiate into Boiler, Steam and Electrical

But to come back to the power station of the present. On systems of size there is almost sure to be, on the electrical side, some sort of system operator or chief operator, distinguished from the chief electrician and his direct organization in that they deal with electrical operation inside the station while he deals with the relation of the station to its external load, so to speak.

On the steam side under the watch engineers and possibly turbine engineers in large stations there are oilers for the main units and often engineers and oilers for the steam auxiliaries. The details of organization depend very largely upon the design of the turbine or engine room, that is, the proximity and accessibility of the auxiliaries from the engine or turbine floor. An important class of men, distinct in a large station, are those who take care of the maintenance of the auxiliaries of the main units. The need of such men is particularly urgent where very high vacuum is maintained in turbines provided with surface condensers and reciprocating dry-vacuum pumps.

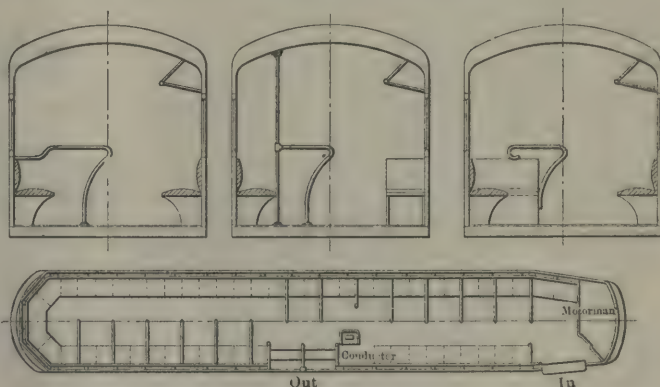
In the boiler room the simple organization of a small station changes considerably to a complexity in stations of very large size. Beside firemen there are sometimes head firemen who see that instructions are observed and the general level of skill maintained. Often the water level is not controlled by the firemen but by water tenders. Over water tenders or head firemen, or both, there are sometimes boiler-room engineers, responsible as a general thing as operating men to the watch engineers of the turbine room or engine room. Of course, size of the plant is the chief factor. In many fairly large plants the chief engineer exercises directly many functions which in plants of very great size he exercises through subordinates.

To discuss organization broadly is to note that it deals in simple manner or complex, depending on size of plant, with the sorts of energy transformation and the apparatus by which the transformations are accomplished. In a steam-operated plant there is one beginning but there are two endings. The beginning is the coal handling. One ending is the removal of the ashes, the other is the delivery of the electric energy to the transmission lines. Many sorts and kinds of apparatus make up the total. To enumerate briefly the

principal links we find coal hoists, coal crushers, coal storage plant, facilities for coal delivery to the boilers, coal feeding into the boilers, coal-combustion appliances and aids, the stacks, flues, economizers and other appliances for caring for the products of combustion, the ash-dumping and ash-removal facilities, boilers for steam generation, superheaters for the increase of efficiency, feed-water pumps and heaters, feed-water purifiers, steam piping, main engines or turbines with their auxiliaries, condensers, condensing-water pumps, air pumps, oil pumps, electric generators, oil switches, switchboard control, electric measuring instruments, outgoing feeders. All of these present their problems for organization aside from their problems of operation.

Stanchions for Longitudinal Seat Cars

THE interest in the front-entrance, center-exit car renders timely a reference to patents granted to George C. Wing and Lewis P. Lipps, of Cleveland, Ohio, on a car interior arrangement designed to insure comfort and safety of passengers. In brief, the points covered are an arrangement of a passageway to one side of the center line of the car and stalls separated by stanchions or hand rails. Several possible forms of rail are shown in the accompanying diagrams.



ARRANGEMENT OF RAILINGS FOR SUBDIVIDING CAR INTERIOR INTO COMPARTMENTS

Although not primarily intended as a support for standing passengers, the rails would perform this function to a certain extent. They also would serve to insure equitable division of seating space among passengers and also of standing space. In addition they are designed to provide assistance to passengers when rising and sitting down.

Constructive Co-operation at East St. Louis

A committee of business men appointed by the East St. Louis (Ill.) Merchants' Association to confer with the officials of the East St. Louis & Suburban Railway has published a report of their conference in which they urge the people of the territory served by this company to co-operate with the officials in making the service satisfactory. They emphasized the importance of this in view of the fact that war conditions and greatly increased costs of production make operation of an electric railway a trying and a hazardous task. The report of the committee was published at length in East St. Louis papers and is a full and frank discussion of problems underlying the operation of the "East Side Electric Lines," as they are called.

The Forces Which Act Upon a Transmission Line

Data Are Given by Means of Which the Factor of Safety of a Pole Line Can Be Calculated The Transmission Line Is Shown to Be One Link in the Transportation Chain

By Charles R. Harte

Construction Engineer The Connecticut Company, New Haven, Conn.

THE present-day tendency to broad publicity shows that at last electric railway operators are realizing the fact that they are merchants, their wares being transportation, and that if they are to be successful they must follow modern methods of salesmanship. Transportation, however, is only the last step; before the goods can be sold they must be produced. The complications of this process and the opportunities which it affords for losses or economies all along the line are hardly appreciated except by those most intimately connected with the details. An investigation of the process from the time when the raw material—the fuel—is delivered to the plant to the time when a ride is delivered to the customer, however, shows that it consists of a number of steps. The investigation will disclose also at least one, and in the majority of cases two, interruptions in the manufacturing procedure while the principal “material” of the ride is being shipped from one shop to the next.

Let us start with the coal pile. The chemical energy locked up there must be transformed in the power station first to heat; then through the agency of steam and the turbines or engines to rotary motion; then in the alternators to electrical energy, and finally in the step-up transformers to an entirely different variety of current for “shipment” over the transmission line. At the substation the incoming energy is again changed to an entirely different form of alternating current; then by the rotaries or motor-generators to direct current, to be shipped over the distribution system to the car, wherein the motors convert it first into rotary motion and then, by the aid of wheels and track, into straight line car motion. The electric railway business involves, therefore, not only retailing the transportation, but producing it in three manufacturing plants and providing two transportation systems to carry the product of each to the next in order.

In the case of a small property, generation, transmission, conversion and distribution may all come under one department, but in larger systems each will have its own more or less complete organization. In a discussion in any detail each step will require individual treatment in many respects.

It is proposed in the series of articles on transmission and distribution lines, of which this is the first, to set out in some detail the purpose and requirements of the several elements, and to describe some of the

materials and practices which have come under the writer's observation. It is hoped that their appearance “once in a while” will result in comment, criticism and additional information; that the sum total of the discussion will form a helpful contribution to the art by indicating what to do or, perhaps, that which the late Dr. Thomas Egleston of the Columbia School of Mines always said was equally important to know—what not to do.

In the transmission of power from the power station to the car it passes in general over the high-tension line, through the substation, over the low-tension feeders and finally through the overhead contact line or third-rail to the trolley wheel or shoe. In the present article we shall concentrate attention largely upon the transmission line, and particularly upon that important element, the pole.

The transmission line is a transportation line pure and simple, with the one function of transmitting high-tension current from generating station to substation. Electrically this requires construction which will keep the current on the wire and

lightning off it. Mechanically there must be strength to resist storm and decay or corrosion, and supports must be provided to keep the wires out of mischief to themselves or others. In theory apparently these are very simple matters; in practice they are often surprisingly complicated, particularly in the case of the long-distance high-potential heavy-power lines. Such lines, however, are a whole subject in themselves, and indeed are more apt to be part of a big general-service power system than part of an electric railway.

The moderate-voltage transmission lines which make up the large majority of those actually a part of “trolley” systems have much in common with distribution lines, and to a considerable extent are combined with them. The greatest difference arises from the fact that while the transmission line serves merely as an industrial carrier between two fixed terminals the distribution line must deliver power to a rapidly moving car at any point along the line. In addition to carrying the current it must provide a satisfactory track for the collecting device. This fact gives the transmission line designer a considerable advantage, his mechanical problems differing only in degree from those which the older telegraph line practice had pretty well solved. Naturally the desire of not a few of those entering the new field to impress the stamp of their originality on the art led to some outrageous construction. The one thing that refused to lend itself to “freak” treatment



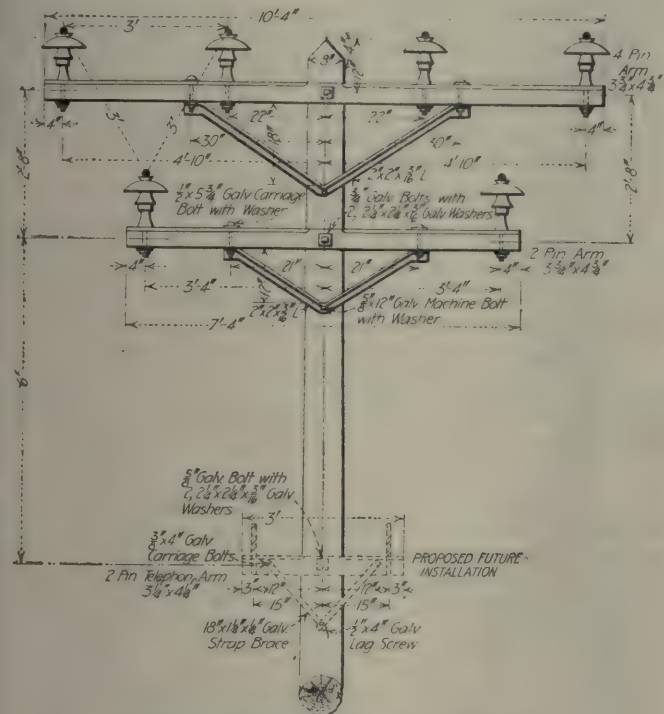
Overhead linemen hastening to repair a link in the transportation chain

was the form of support which probably for some time to come, as heretofore, will carry a good majority of the lines, namely, the wood pole.

The Pole Must Be Considered as a Beam

The line poles have three mechanical functions. They must support the dead weight of the line, withstand the tendency of the line and the wind to overturn them sideways, and hold the line sufficiently above the ground to provide adequate clearance.

In its direct effect the dead load is of comparatively little importance as regards the pole itself. Crossarms and other attachments, even though relatively numerous, do not weigh much. The pole top shown in the



TYPICAL TRANSMISSION LINE POLE TOP

illustration, which is for two No. 00 copper circuits with 150 ft. normal span insulated for 45,000 volts but to operate at 33,000, has a dead load made up as follows:

Six insulators, 11 lb. each.....	66 lb.
Six pins, 5 lb. each.....	30 lb.
Crossarms, 58.5 + 41.5 lb.....	100 lb.
Braces, 14.5 + 11.5 lb.....	26 lb.
Bolts, etc.....	10 lb.
Conductors, 6 x 150 ft., 0.403 lb. per ft.....	363 lb.
Total	595 lb.

With the conditions specified in the National Electric Safety Code as "heavy loading," a dead load of 1230 lb. is produced. This provides for a coat of sleet $\frac{1}{2}$ in. thick, making the diameter of each wire practically $1\frac{1}{2}$ in. The specified wind pressure of 8 lb. per foot, which is also a considerable part of the heavy loading, is assumed to act horizontally, and so does not affect the vertical load. The sleet increases the loading by 535 lb., to which must be added probably 100 lb. due to the ice on the arms and the pole itself. This 1230 lb. is far below the capacity of any ordinary pole acting simply as a strut, but its effect on the arm is quite a different story.

Considering the pole as a beam, however, the effect

of the loading in conjunction with wind, or in the unhappy case of unbalanced stresses due to some form of failure on either side, is a more serious matter. Before considering this, however, it is well to see what are the forces which must be overcome.

Estimating Maximum Stresses on Transmission Lines

The two forces which may tend to overturn a pole are those due to the wind and to the unbalanced pull of the conductors. The assigning of proper values to these forces in designing a line was the subject of bitter discussion until the appearance in 1911 of the "Specifications for Overhead Crossings of Electric Light and Power Lines." This work was prepared by a joint committee of the National Electric Light Association (at the instance of whose committee on overhead line construction, and particularly of Farley Osgood, chairman of the committee, the work was undertaken), the American Institute of Electrical Engineers, the American Electric Railway Association, the Association of Railway Telegraph Superintendents and the American Railway Engineering and Maintenance of Way Association (now the American Railway Engineering Association). The interests of the telephone companies, which have no corresponding national organization, were represented by F. L. Rhodes and H. S. Warren of the N. E. L. A. and A. I. E. E. respectively.

This committee selected the following as reasonable maximum pressures upon sleet-covered structures: 8 lb. per square foot of area of conductors with a coat of sleet increasing the diameter by 1 in. ($\frac{1}{2}$ in. of sleet) and 13 lb. per square foot "on the projected area of solid or closed structures and one-and-one-half times the projected area of latticed structures." These pressures correspond to an "indicated" wind velocity of about 70 m.p.h., or an actual velocity of about 60 m.p.h., the difference being due to the fact that the usual cup anemometer gives readings higher than the actual velocities.

Velocities higher than those specified do occur, but almost never with sleet. In the case of large towers in exposed positions such higher velocities against the uncoated surfaces may require special consideration, but as a rule, on the rare occasions when such velocities occur the reduction in area by the loss of the sleet more than offsets the higher pressures.

A Few Peculiarities of Sleet

The production of sleet on transmission lines requires a peculiar condition, namely, a temperature below freezing on the ground with one above freezing higher up so that the rain or wet snow does not freeze until it strikes the line. A very little temperature change fortunately stops the process, but altogether too frequently for the engineer's peace of mind the critical conditions endure long enough to do serious damage. The thickest sleet coat is much of the same class as the biggest trout caught; details are best remembered long afterwards. At the time of the occurrence the sentiment of all involved is apt to be that of a lineman whose failure to get some actual measurements in view of the previous specific requests for facts was mildly commented on by the writer. In this case

the prompt "come-back" was "It bust the line; what the h— more do you want!"

Sleet ranges from a porous white and comparatively light form through all grades up to a beautifully clear ice. As a rule the white ice, some of which is almost as heavy as the clear ice, occurs with heavy winds. The clear ice is apt to form in quieter times, and to be followed promptly by clear cold weather with high wind. However, there seems to be no certainty in the matter and either form of sleet may do great damage.

The severe storms of 1909, one of which "assisted" in the inauguration of President Taft, were of the frozen-snow type. The storm of Dec. 13, 1915, was chiefly one of clear ice. The latter was notable in that, although it left the "overhead" practically uninjured it put the New York division of the New Haven Railroad out of business for several days by wrecking its communication lines. In these particular storms the damage was chiefly due to the weight of the accumulations. It occurred very largely on communication lines, the heavy leads of light wire afforded a particularly good opportunity for trouble.

How Geography Affects the Sleet Question

The evidence collected since the work of the joint committee was completed has shown the fairness and wisdom of its standard, and the ½-in. ice and 70 mile, zero-degree wind have been adopted by the federal Bureau of Standards in the new National Electrical Safety Code, the last word on the subject. In the code, however, the pressure against supports has been taken at 12 lb. instead of 13 lb. per square foot and lighter loading is prescribed for those sections of the country in which heavy sleet storms do not occur.

The district of heavy loading comprises all territory north of a line starting at the mouth of the Potomac River, passing east of Raleigh, N. C., along the line of the southern boundary of Tennessee to the Mississippi, in a southerly direction to Dallas, Texas, and thence northward in curve cutting off the northeast corner of New Mexico, through the northwest corner of Colorado to a point on the Canadian border about 100 miles east of the northwest corner of Montana.

The region of medium loading lies between this line and one which starts near Beaufort, N. C., runs south of Aiken, S. C., parallels the heavy-load region to a point near Waco, Texas, and thence sweeps west, passing into New Mexico at the Pecos River, through the south corner of Nevada and the valleys of the San Joaquin, Sacramento and Klamath Rivers to the Pacific. In the territory between this and the heavy loading area the maximum loading of the conductors is assumed to occur at a temperature of 15 deg. Fahr., and to be two-thirds of the value of the resultant of the wind and ice loads in the heavy loading district unless, as is the case with large conductors, this reduced value is less than one and one-fourth times the weight of the bare conductor. Under such circumstances one and one-fourth times the weight of the bare conductor is to be used, while for the supports the pressure is taken at 7 lb. per square foot. In the district lying south and west of this medium-loading area sleet is practically unknown, and for this section the maximum load is assumed to occur at 30 deg. Fahr., and to be four-ninths of the value of the resultant of the wind and ice loads in the

heavy-loading district, but in no case less than one and one-fourth times the weight of the bare conductor. For the supports the pressure is taken at 4 lb. per square foot.

Some Examples and Applications

Let us now get down to the practical application of all of this. The several forces pushing on the pole tend to break it off at the ground line if it is well set. The fibers of the pole resist this tendency, and the problem is to pick a "winner" for the pole.

The force against the pole is practically as follows:

$$\text{Force}_1 = \frac{\text{butt diameter} + \text{top diameter}}{2} \times \text{length}$$

above ground \times wind pressure per square foot. The pole dimensions are all in feet.

The effect of this force over the entire length is as if it was all applied at a point midway between top and ground. The force resulting from the wind against each ice covered conductor is:

$$\text{Force}_2 = \frac{\text{conductor diameter} + 1 \text{ in}}{12} \times \frac{1}{2} \text{ length of}$$

each adjacent span \times wind pressure per square foot. The conductor diameter is in inches and the span length is in feet.

In the case of the pole top previously considered the average pole is 35 ft. long, with 6 ft. in the ground; the top diameter is 8 in., and the ground-line diameter is 13 in. For the heavy loading region we have:

$$\text{Force}_1 = \frac{1.08 + 0.67}{2} \times 29 \times 12 = 304.5 \text{ lb.}$$

$$\text{Bending moment at ground line} = 304.5 \times \frac{29}{2} = 4414 \text{ lb.-ft., due to the pole itself.}$$

For each wire:

$$\text{Force}_2 = \frac{0.42 + 1.0}{12} \times \left(\frac{150}{2} + \frac{150}{2} \right) \times 8 = 142 \text{ lb.}$$

For the upper set:

$$\text{Bending moment} = 4 \times 142 \times 29 = 16,472 \text{ lb.-ft.}$$

For the lower set:

$$\text{Bending moment} = 2 \times 142 \times (29 - 2.67) = 7478 \text{ lb.-ft.}$$

$$\text{The total bending moment} = 4414 + 16,472 + 7478 = 28,364 \text{ lb.-ft.}$$

The moment of resistance of the pole in pound-feet is equal to 0.0002638 times the fiber stress in pounds per square inch times the cube of the circumference at the ground line in inches. If we make this equal to the pound-feet bending moment due to the wind we get the fiber stress as follows:

$$\text{Fiber stress} = \frac{0.0002638 \times 41 \times 41 \times 41}{28,364} = 1560 \text{ lb. per square inch.}$$

As the breaking strength of chestnut, cypress, Southern pine and Western red cedar is 5000 lb. per square inch and of Northern white cedar 3600 lb. per square inch, sound poles of the first-named woods 41 in. in circumference at the butt would provide, under the conditions given, a factor of safety of 3.2. For Northern white cedar the safety factor would be 2.3. A factor of safety as low as that for Northern white cedar would

Railroad Electrification and Conservation of National Resources*

In the Author's Opinion Electrification Offers the Most Immediate and Practicable Means for Increasing Our Transportation Capacity—And "The Way to Electrify Is to Electrify"

BY E. W. RICE, JR.

President, The General Electric Company, Schenectady, N. Y.

WHILE electrical science and industry are fundamentally devoted to the products and conditions of peace electricity plays also an important part in the grim business of war. We are in the midst of an extraordinary coal famine, due to causes which it is perhaps undesirable for us to attempt to outline. However, the situation might have been much worse were it not for the contributions of the electrical engineer. Furthermore, our condition might have been much better if the contributions of the electrical industry had been more extensively utilized.

Suppose we assume that the present serious situation is due to a lack of production of coal. It is comforting to consider to what extent conditions surrounding such production have been improved and how the output of our coal mines has already been increased by the use of electrical devices in connection with coal mining. I think it is a fair assumption that the output of coal mines should have been increased at least 25 per cent on the average by the employment of such electrical devices. If this estimate were cut down to 10 per cent it would still leave a possible increase of something like 50,000,000 in the tonnage of coal produced during the last year.

If on the other hand our situation is not due to a shortage in the production of coal but rather to the

failure of the distributive agencies of the country, which is more probable, this difficulty would have been largely removed if the railroads of the country had been operated by electricity instead of steam.

TRACK CAPACITY INCREASED BY ELECTRIFICATION

Where electricity has been substituted for steam in the operation of railroads, fully 50 per cent increase in available capacity of existing tracks and other facilities has been secured. This increased capacity has been due to a number of causes, but largely to the increased reliability and capacity of electric locomotives under all conditions of service. They thus permit a speeding up of train schedules by some 25 per cent under average conditions. Of course, under the paralyzing conditions which prevail in extremely cold weather, when the steam locomotives practically go out of business, the electric locomotives make an even better showing. It is well known that extreme cold (aside from the physical condition of the traffic rail) does not hinder the operation of the electric locomotive, but actually increases its hauling capacity. At a time when the steam locomotive is using up all of its energy by radiation from its boiler and engine into the atmosphere, leaving practically no useful power available to move the train, the electric locomotive is operating under its most efficient conditions, and may even haul a greater load than in warm weather. It may there-

(Concluded from page 366)

make close attention to pole condition desirable and necessitate prompt renewals later on.

It is always desirable by calculation to test the probable strength of the poles used. For the average line "Class B" poles will almost always serve, but definite figures made at the time the line was built are

Circumference of Pole at Ground Level in Inches	Breaking Moment in Pound-feet for Fibre Stress in Pounds per Square Inch of	Circumference of Pole at Ground Level in Inches	Breaking Moment in Pound-feet for Fibre Stress in Pounds per Square Inch of
	5000		3600
30	35,620	46	128,400
31	39,300	47	136,940
32	43,220	48	145,880
33	47,400	49	155,200
34	51,840	50	164,880
35	56,560	51	174,960
36	61,540	52	185,460
37	66,820	53	196,360
38	72,380	54	207,700
39	78,240	55	219,450
40	84,440	56	231,640
41	90,900	57	244,270
42	97,720	58	257,350
43	104,860	59	270,890
44	112,360	60	284,900
45	120,200		

often of great value in later discussions with regulative bodies.

The following table gives the maximum resisting moments of poles for fiber stresses of 5000 lb. and for 3600 lb. The former is a conservative *breaking* value for sound chestnut, cypress, Southern pine and Western red cedar, and the latter for Northern white cedar. The actual stresses should in no case exceed one-half of the values of the table.

It is the general practice to assume that any ordinary unbalanced pull in the direction of the line will not exceed that resulting from a cross-line wind against iced conductors. Pulls resulting from angles, long spans, and possible conductor failures are almost invariably met by special guys or braces. Occasionally, however, it becomes necessary to meet the stress with an unguyed pole, in which case a more careful analysis must be made. This will be considered later in connection with special structures. For the general line the assumption that the weakest point of the pole is at the ground line is sufficiently accurate.

*Abstract of address delivered at the Midwinter Convention of the A. I. E. E., Feb. 15, 1918.

fore be said that cold weather offers no terrors to an electrified road. On the contrary, cold weather is a stimulant to better performance instead of a cause of prostration and paralysis.

But this is not all. It is estimated that something like 150,000,000 tons of coal was consumed by the railroads in the year 1917. Now we know from the results obtained from operation of such railroads as are already electrified in this country that it would be possible to save at least two-thirds of this coal if electric locomotives were substituted for the present steam locomotives. On this basis there would be a saving of more than 100,000,000 tons of coal in one year. This is an amount three times as great as the total amount of coal exported from the United States during 1917.

The carrying capacity of our steam roads is also seriously restricted by the movement of coal required for hauling the trains themselves. It is estimated that fully 10 per cent of the total ton-mileage movement behind the engine drawbar is made up of company coal and coal cars, including in this connection the steam-engine tender and its contents. In other words, the

power could be so employed and as to the amount of coal which could be saved by its use. There is no doubt that a very considerable portion of the coal now wastefully used by the railroads could be released, to the great and lasting advantage of the country.

The terrors of these "heatless days" will not have been without benefit if they direct the attention of the people and of our legislators to the frightful waste of two of our country's most valuable assets—our potential water power and our wonderful coal reserves. The first is being lost largely because most of it is allowed to run to waste—undeveloped, unused. The second asset is wasted for exactly the opposite reason. It is being used, but in an extravagant and inefficient manner.

While the amount of coal in this country is enormous, it is definitely limited; when once exhausted it is gone forever. It is really terrifying to realize that 25 per cent of the total amount of coal which we are digging from the earth each year is burned to operate our railroads under such inefficient conditions that an average of at least 6 lb. of coal is required per horsepower-hour of work performed.

It is not too much to say that if the roads of the country were now electrified no breakdown of our coal supply due to failure of distribution would now exist. What this would mean for the comfort of the people and the vigorous prosecution of the war can readily be imagined.—E. W. RICE, JR.

useful or revenue carrying-capacity of our steam roads could be increased about 10 per cent with existing track facilities by eliminating the entire company coal movement.

I have not mentioned the consumption of oil by the railroads. This we are told amounted in 1915 to something like 40,000,000 barrels, nearly 15 per cent of the total oil produced. This fuel is far too valuable to be used in a wasteful manner. It is important for many reasons that such a wonderful fuel as oil should be most economically used, if for no other reason than that it will be needed for the ships of our forthcoming merchant marine, for the tractors that till our fields and for the motor trucks that serve as feeders to our railroads.

ELECTRIFICATION PERMITS THE USE OF WATER POWER

The possible use of water power should also be considered in this connection. It is estimated that there is not less than 25,000,000 hp. of water power available in the United States. If this were developed and could be used in driving our railroads, each horsepower so used would save at least 6 lb. of coal now burned under the boilers of our steam locomotives for each horsepower-hour developed. It is true that this water power is not uniformly distributed in the districts where the railroad requirements are greatest, but the possibilities indicated by the figures are so impressive as to justify careful examination as to the extent to which water

The same amount of coal burned in a modern central power station would produce an equivalent of three times that amount of power in the motors of an electric locomotive, even including all the losses of generation and transmission from the source of power to the locomotive. Where water power may be utilized, as in our mountainous districts in the West, all of the coal used for steam locomotives can be saved. In the Middle and Eastern states, however, water powers are not sufficient and it will be necessary in a universal scheme of electrification for the locomotives to be operated from steam-turbine stations. However, as already stated, the operation of the electrified railroads from steam-turbine stations will result in the saving of two-thirds of the coal now employed for equivalent tonnage movement by steam locomotives.

It is therefore not too much to say that if the roads of the country were now electrified no breakdown of our coal supply due to failure of distribution would exist. What this would mean for the comfort of the people and the vigorous prosecution of the war can readily be imagined.

Of course, this picture which I have briefly and inadequately sketched of the great benefits which our country would have received if the roads had been electrified does not improve our present situation and it may be claimed that any discussion of such a subject at this time is of an academic nature. This is true, in a sense, but I think that we can properly consider it on account of the effect which it may have upon our

future efforts. The picture is not merely an inventor's dream but is based upon the solid foundation of actual achievement.

We have had enough experience upon which to base a fairly accurate determination of the stupendous advantages and savings which will surely follow the general electrification of the railroads. In fact I think that we can demonstrate the fact that there is no other way known to us by which the railroad problem facing the country can be as quickly and as cheaply solved as by electrification. The solution of the railroad problem would also "kill two birds with one stone" by solving the fuel problem at the same time.

KEEPING PACE WITH THE COUNTRY'S DEVELOPMENT

If it is a fact, as has been stated, that the steam railroads of the country have failed to keep pace with the country's productive capacity, with the increase in output of manufacturing industries, and the extension of agriculture and other demands for transportation, then it is obvious that if the country is to go ahead the railroad transportation problem must be solved, and it must be solved at the earliest possible date. It becomes a matter of national importance that the best solution should be reached in the shortest possible time. That solution is best which will give the greatest amount of transportation over existing tracks in the most reliable manner and, if possible, at the lowest operating cost. As electrical engineers we are confident that we can make good our claim that the best solution is to be found in a general electrification of the railroads. That such a solution would be of great advantage to our profession and to our industry is important.

But this is not as important as the great advantage which it would be to our country, freeing it as it would from the present threatened paralysis of business, possibility of untold human suffering and incalculable financial loss. It should give us courage and optimism for the future of our profession to contemplate the service which we may render in this direction and which it seems to me is immediately at hand.

It should arouse in all of us, and particularly in the younger engineers, an enthusiastic confidence in the present and future stability and value of our profession and of the electrical industry. It should satisfy the young engineer that the opportunity for him to render important service is as real and great to-day as it has been in the past for those of us who have seen and participated in the marvelous growth of the industry up to the present time.

ELECTRIFICATION IS NO LONGER EXPERIMENTAL

We would not be justified in being so confident of the benefits of electrification of railroads if every element in the problem had not been solved in a thoroughly practical manner. The electric generating power stations, operated either by water or by steam turbines, have reached the highest degree of perfection, efficiency and reliability, while the transmission of electricity over long distances with reliability has become a commonplace. Electric locomotives, capable of hauling the heaviest trains at the highest speeds over the heaviest grades, have been built and have been found in practical operation to meet every requirement of an exacting service. There is, therefore, no element of uncertainty, nothing experimental or problematical,

which should cause us to hesitate in pressing our claims upon the attention of the country. Electrification of railroads has progressed with relative slowness during these many years, waiting upon the development and perfection of all of the processes of generation and transmission and of the perfection of the electric locomotive itself. When all of these elements had been perfected, as they now have been for several years, the railroads found themselves without the necessary capital to make the investment.

I realize that the task of electrifying all of the steam railroads of the country is one of tremendous proportions. It would require under the best of conditions many years to complete and would demand the expenditure of billions of dollars. The country, however, has clearly outgrown its railway facilities and it would require, in any event, the expenditure of billions of dollars and many years of time to bring the transportation facilities up to the country's requirements.

ELECTRIFICATION NEED NOT BE UNIVERSAL

It is not necessary that electrification should be universal in order to obtain many of its benefits. It is probable that the most serious limitation of our transportation system, at least in so far as the supply of coal is concerned, is to be found in the mountainous districts and it is precisely in such situations that electrification has demonstrated its greatest value. Electrification of a railroad in a mountainous district will in the worst cases enable double the amount of traffic to be moved over existing tracks and grades.

If a general scheme of electrification were decided upon the natural procedure would, therefore, be to electrify those portions of the steam railroads which would yield the greatest results and give the greatest relief from existing congestion. Electrification of such sections of the steam railroads would have an immediate and beneficial effect upon the entire transportation system of the country.

It may be said that the present is not a propitious time in which to deflect any of the country's money into railroad electrification. In spite of the enormous advantages of which I have spoken, I should be inclined to agree with such a point of view if it were not for the recent unpleasant demonstration of the failure of our railroad transportation systems to meet the demands which have been placed upon them by the industries, aggravated it is true by the war conditions and also by the unkindness of the weather. After all, the question for the country to decide is whether we dare to limp along with the present conditions of restricted production, due to limited transportation, at a time when the world demands and expects from us the greatest possible increase in our efficiency and total production.

What assurance have we that the present conditions are temporary, and even if they improve as they surely shall with the coming of warm weather, what are we going to do next winter? Of course, even if we should start electrification at once we could not have all our railroads electrified by next winter, but we could have made a good start, and as Sherman said about the resumption of specie payments—"The way to resume is to resume," so we may say in this connection "The way to electrify is to electrify."

Classifying Passenger Cars for Given Conditions

A Different Car for Each Railway Unnecessary—Weight Provision Against Collisions Unimportant in Slow-Speed Service—Six Categories of Service Outlined

By Norman Litchfield

THE business of transporting passengers successfully requires the co-ordination of many mechanical units, the development of any one of which forms a subject whose history would be of interest to trace. No single one of these can be said to be more vital to the operation of the railroad than another, but from the rider's standpoint it is the car, together with the character and conduct of the employees on the car, that determines his estimate of the road and its management. The power house may contain the most marvellously efficient generating machinery, the track may be of most modern construction, the thousand and one other details may be covered flawlessly, but if the car does not provide the means for transporting him to his destination in safety, comfort and speed, whether he be bent on business or pleasure, the passenger rightly criticises the management and if possible withdraws his patronage. In fact, it may be said for the average rider that the car and its crew typify the railroad.



Existing cars should be analyzed for evidence of unnecessary weight

The Car Is a Tool for Producing Mileage

In view of the above conditions operating officials and car designers have joined hands to produce types which their combined judgment and experience have shown to be necessary to meet the rider's needs. Within the last few years the increasing use of steel has made it possible to fulfill requirements which otherwise would have been unattainable and has served as an impetus in the design of many interesting types of car developed to meet different conditions.

The railway operator may be considered as the manager of a factory whose output is transportation, and the cars as machine tools for the production of mileage. The more mileage the car produces, the higher the efficiency of the investment in track, power station, etc., and of the car itself and the employees on the car.

The efficiency of the car itself, or its ability to produce mileage consistently and without attendant losses from damage claims, etc., depends upon the arrangement and construction of the car and its running gear, and also upon its motive equipment, brakes, and other auxiliary apparatus. The studies covered by these articles will, however, deal only with the design and construction of the car itself.

It is evident that the broad field of electric passenger transportation cannot be covered by one type of car. It is difficult to draw absolutely certain lines of demarcation, defining groups in which different types of cars should be used, but it may be said that these fall

roughly into six main divisions into one of which any given set of conditions may be placed. Probably no phrase has been more misused than that of "local conditions," for while it may be possible to use a car 6 in. longer and 2 in. wider than some one else can, it does not necessarily follow that it is wisest to do so.

The six groups referred to follow:

1. Car for towns and cities up to 100,000 population.
2. The large car for the heavy industrial lines of cities in excess of 100,000 population.
3. The two-car city train, where the extreme conditions of loading great factory crowds is met.
4. The subway-elevated car for multiple-unit train operation.
5. The car for light, frequent inter-urban service.
6. The car (motor and trailer) for long-distance high-speed interurban operation, large enough to include smoking, toilet, baggage and mail compartments.

It has been rightly said that any art goes through three broad stages, namely, invention, development and refinement. Electric railroading may be considered to have passed fairly well through the former two periods and to be, generally speaking, in the period of refinement. It is not that invention and development have ceased or will cease, but that they are no longer the outstanding feature of the art. The time was, and at a period not far distant, when the electric manufacturers designed an individual motor for every new set of conditions presented to them, even sometimes despite the wishes of the user. In fact, it is said of one official that he felt that the only safe specification for him to draw up was one reading, "I want a motor the exact duplicate of those now operating on the A. B. & C. Railway." But that time is passing. The tendency is toward a smaller number of types of motors, each of which will cover a number of conditions. So it is fair to say that very nearly any set of conditions may be said to be included in one of the six groups enumerated.

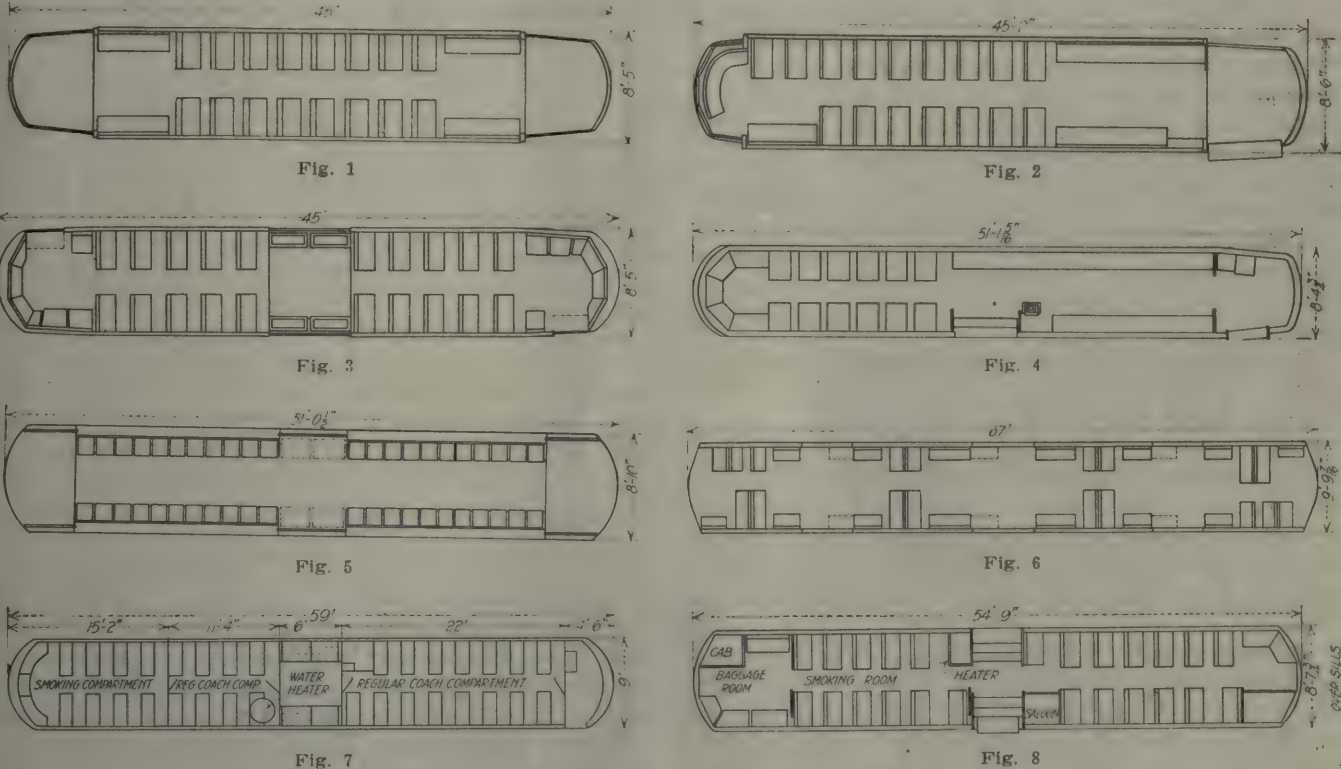
Different Conditions to Be Satisfied According to Service

We may then ask ourselves, what do we demand of each class of car? In general, it may be said that in city surface cars there are four prime essentials, namely, capacity, facility for passenger interchange, ease of fare collection and freedom from boarding and alighting accidents.

These features are equally desirable for the town or city of less than 100,000 population and for the larger city, the difference being of degree rather than of essentials. It is axiomatic that the number of cars a road must operate on any given line depends first upon the total number of passengers at the peak period and secondly on the interval that must be maintained in

order not to lose patrons. The second item is often controlling in the small town throughout the entire day, just as it is in the large city during the non-rush hours. In other words, a service giving a succession of small cars at frequent intervals is obviously more popular than one with large cars for which the patron has to wait, even though in neither case are the cars crowded. It therefore follows that the small cities have been turning more and more to the smaller car. But with the increase in frequency of the service comes an increased platform charge and power consumption per passenger carried or nickel received, and when it is remembered that the platform charge under the best

duties of the crew to the minimum. It therefore follows that fare collection and the quick loading and unloading of passengers become of prime importance. Since the earliest days of electric railways considerable attention has been paid to the platform arrangement with the idea of facilitating the handling of passengers. In 1901 a long platform car was operated in Detroit with a railing dividing it into two passageways, the idea being that some passengers would always insist on riding on the platforms, and that by requiring them to keep behind the railing a passage could be kept clear. This naturally required an exceedingly long platform, and as city cars are limited in length, it sub-



FLOOR PLANS OF CARS FOR VARIOUS CLASSES OF SERVICE

of circumstances amounts to a third or more of the total operating expenses, it is evident that this feature is of great importance. For the above reasons the one-man or so-called safety car has been developed. This type has been described in recent issues of the JOURNAL. We have designated it for cities under 100,000 in population except on lines of unusually heavy travel. This at once provides the prepayment fare-collection features, reduced weight and platform charges and reasonable facility of passenger interchange for the conditions under which it is supposed to operate.

Where the Biggest Car Is Needed

For the larger cities, the congested conditions require the use during the rush hour of as many cars as can be accommodated on the tracks, each of as great capacity as can be operated safely under the conditions of track curvature. In this case, therefore, the platform charge cannot be reduced by the elimination of the conductor. In fact, special aids must be provided to reduce the

tracted that much from the desirable seating space in the body of the car. The problem of easy passenger interchange is closely bound up with that of fare collection, the solution of which was first successfully made by Duncan McDonald and W. G. Ross in the first Montreal pay-as-you-enter cars in 1906. In a description of these cars Mr. McDonald pointed out that up to that time there were four systems of fare collection in vogue, namely, the register, the portable fare box, the receipt system, in which each passenger was given a receipt (the receipts being checked occasionally by inspectors) and the prize system, in which prizes were drawn for by the holders of receipt coupons. He concludes that the task imposed upon the conductor under any of these systems is well-nigh impossible of fulfillment, and that the only ideal system is that in vogue on the elevated and subway systems wherein passengers have to pay before entering the car on which they desire to travel. While there have been many variants on Mr. McDonald's car, the essential soundness of his views has been amply demonstrated, and the fundamentals are em-

bodied in every surface car now being built. This keeps the conductor close to the point where passengers embark and leave the car and has gone far in the reduction of that exceedingly troublesome and wasteful feature of old-time surface car operation—the boarding and alighting accident.

More latterly has come the use of platform doors and folding steps controlled by either the conductor or the motorman, and interlocked with the motors and control so that the car cannot be started until the doors are closed, and in some cases also arranged so that the doors cannot be opened until the car has come to a dead stop. These features have to a large extent eliminated the boarding and alighting accident.

The final factor in facilitating passenger movement has been the elimination of steps by careful design, dropping the car floor to a minimum distance above the street level. All of these factors have brought the remarkable results of handling passengers at the rate of about one second each, reducing the lost fares to a fraction of 1 per cent, and the practical elimination of boarding and alighting accidents. There are to-day four distinct types of large city cars, as follows:



Stress diagrams meant little to the old-time car builder

Rear-entrance, front-exit, or ordinary pay-as-you-enter car, Fig. 1.

Front-entrance, front-exit, or near-side car, Fig. 2.

Center-entrance, center-exit, Fig. 3.

End-entrance, center-exit, or "pay-as-you-pass car," Fig. 4.

Each of these types has its advocates, and all possess certain distinctive features, but nevertheless have in common the fundamentals which have already been outlined.

We have already pointed out that in large cities it is necessary during the rush hours to run as many units as is physically possible, each of which must be of maximum capacity. A practical limit in the size of the car is finally reached at a length of from 45 ft. to 48 ft. When a larger unit is demanded for use under conditions such as the home-going of the employees of one of our large industrial plants, all at the same hour, it becomes necessary to employ the two-car train. This is sometimes composed of a motor car with a trailer, but this combination has a number of disadvantages; and the development of a light, inexpensive type of multiple-unit control and a semi-automatic air brake has made possible and economical the use of two motor cars. The latter arrangement is rapidly coming into favor. The remaining feature to be thoroughly developed is that of the automatic electric coupler, and it is reasonable to expect that this will be accomplished in the near future.

Door Location Vital in Subway Cars

In city cars operated in subways fare collection disappears, but passenger interchange increases in importance, and there is added the feature of protection against damage from collision. For the interchange of passengers it has been found desirable to make the proportion of doorways to passengers carried as large as possible and to minimize the distance of any passenger from a door. The size of car is largely controlled by

existing conditions of track curvature, length of station platform, and by the determination of the most economical unit for combining with trains of different lengths at various hours of the day when the density of traffic varies. Two examples of this type are shown in Figs. 5 and 6.

In interurban cars the comfort of the passengers becomes a controlling factor, requiring the introduction of features not demanded or even desired by the public on the other class of car. (See Figs. 7 and 8.)

City Cars Need Not Be Weighted to Be Collision Proof

It may be noted that the feature of protection against collision begins to enter with the high-speed car. By this it is not meant that reasonable precautions against damage from collision should be overlooked in the city car but that city cars do not need to have weight put into them to make them, as it were, collision proof. The speed at which they operate is so low as to make them ordinarily controllable with the modern brakes. There is no need to prepare them for blows unattainable except at speeds they will never be called upon to reach. A close analogy may be

found in the Ford automobile, which, admittedly not designed to withstand collision, wends its way through the most dense traffic in safety due to its ease of control. Mr. Ford himself has pointed this out in his recent criticism of certain steam car weights, that it was like using a 75-lb. basket to carry 25 lb. of groceries.

From 1250 Lb. to 500 Lb.
per Seat

Considerable advance has been made in recent years along these lines, as may be evidenced by the instance of a city surface car built some years ago weighing approximately 50,000 lb. and seating forty passengers, making a dead weight of 1250 lb. per seated passenger; whereas cars now available for similar service weigh 35,000 lb. and seat fifty passengers, or 700 lb. per passenger. In fact, smaller cars are in use whose dead weight is not over 500 lb. per seated passenger. These reductions are due partly to the improvement in materials and design of motive apparatus forming a part of the car equipment; and partly to the use of steel in the car and truck construction disposed along scientific lines at the points where it is needed. The methods by which the proper proportioning of various parts may be arrived at will be reviewed in a future article.

Every former employee of the Toledo Railways & Light Company, Toledo, Ohio, who is now in military service, is to receive letters from the associates he has left behind him in Toledo. A schedule has been arranged whereby everyone now working for the company will write to each of the 170 former employees who are in camp. In this way it is believed that each soldier will in time get a letter from every one of his associates in Toledo. This scheme was suggested by Frank R. Coates, president of the company, who on his visit to the cantonments at Montgomery, Ala., and Chillicothe, Ohio, saw that nothing pleases the soldiers more than a letter from someone "back home."

Patriotism and Science at A. I. E. E. Mid-Winter Convention

President E. W. Rice, Jr., in Two Notable Addresses Analyzed the War Situation and Showed How Electrification of Railroads Would Help

THE American Institute of Electrical Engineers held its sixth mid-winter convention in New York City on Feb. 15 and 16 with an attendance of about 400 at the meeting and 225 at an informal dinner on the evening of Feb. 15. In recognition of the state of war in which the country finds itself there were no entertainment features in the program, and the papers were short and scientific in character.

The opening remarks by President E. W. Rice, Jr., president General Electric Company, Schenectady, N. Y., dealt almost entirely with steam railroad electrification and what it could do in preventing a recurrence of the recent freight congestion. His remarks are given in extended abstract elsewhere in this issue.

President Rice was the only speaker after the informal dinner, and he took this occasion to correct the misapprehension on the part of those who feel that we could have done much better in our recent war preparations. After mentioning some of the events which superficially appear discouraging, he raised the question: "Is it true that we are making a failure of the job?" In answering this question he expressed among others the following convictions:

"It seems clear to me that we have not made a failure and that everything is moving along as well as we had

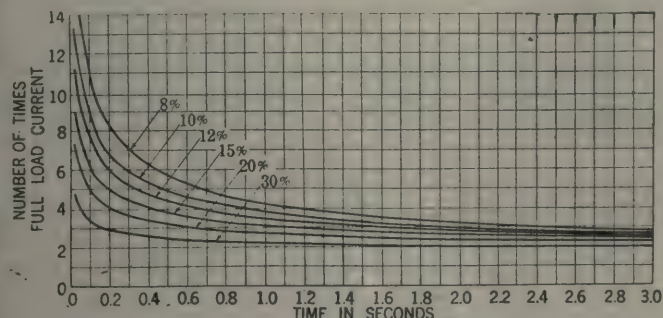
'coalition government'; why cannot we do something similar?

"After all, in my opinion the exact form of any organization is relatively unimportant. Its effectiveness in value is largely dependent upon the men who are on the job. Every organization must demonstrate what it can do to help the country in its hour of need. Every organization, whether of capital, labor, manufacture or business, and every individual, must be subjected to the test of whether each is doing the best and most effective work to win the war.

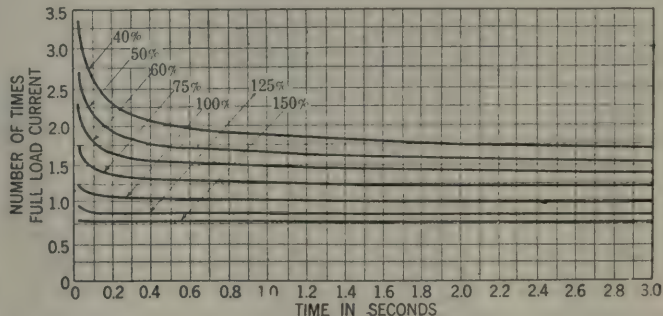
"The test of patriotism will be the willingness to work, each in his sphere, to the absolute limit. We need the maximum output of brains, labor and material. The country demands this, and the country will see that it is obtained. Any man or organization standing in the way of the purpose which this country has set for itself will eventually be crushed.

"It takes time for us to get over our ideas and practices based upon our competitive conditions and education. We are now to forget our competition and education and think of nothing but co-operation; in other words, of what is best to increase the country's production as a whole, for that is vital in winning the war.

"I believe that the problem facing us will be successfully solved in time, but we need more co-operation, more of the spirit of accommodation, all of our patience and wisdom, and, above all, a willingness to work to the limit. We must discipline ourselves until a shirker in any field of useful effort will be regarded with the same contempt as a shirker in the military service of the



These curves, plotted between duration of short circuit and root-mean-square current in terms of full-load current, show the current which must be interrupted in a circuit of given total per-



centage reactance at any time after the short circuit has occurred. Initial load at 80 per cent power factor is assumed. Reactance is based on total kva. rating of synchronous machines.

CHARACTERISTIC CURVES FOR SHORT-CIRCUITS ON ENTIRE POWER SYSTEM

a right to expect under all the circumstances. In spite of eminent authority, a million men cannot spring to arms overnight; nor can dreadnoughts, destroyers, submarines, anti-submarine devices, heavy ordnance, and all the great mechanism of war be produced in a day, in a month or even in a year, no matter how much we pray, 'cuss' or work. Our fundamental mistake was that we waited until war was thrust upon us before we started to get ready.

"This is a people's war, a war for democracy. This fact being recognized, we should not attempt to handle the job on the basis that it is to be run exclusively by the party in power. All of the people must be represented. It seems quite probable that the questioning attitude of the country to-day is due more than anything else to a growing fear that the full ability, wisdom and experience of the country are not being properly utilized. England has met the situation by a so-called

country, for there is no difference; or if there is any difference, a shirker behind the lines is worse than one in the trenches."

Of the nine papers presented at the technical sessions, most were of a theoretical character or were in fields remote from electric railway practice. That on "Rating and Selection of Oil Circuit Breakers," by E. M. Hewlett, J. M. Mahoney and G. A. Burnham, of the General Electric Company, Schenectady, N. Y., which was read at the Feb. 15 morning session, was a practical one and of electric railway interest.

The object of this paper, as stated by the authors, was threefold: (1) To discuss the interpretation of the A. I. E. E. rules covering the rating of oil circuit breakers, (2) to discuss the factors involved in the proper selection of oil circuit breakers, and (3) to suggest average system short-circuit characteristics useful for selecting oil circuit breakers for certain systems.

Annual Report of Association

Secretary-Treasurer Submits Report to Executive Committee—Comparison Is Published with Figures of Last Year

USUALLY the report of the secretary and treasurer of the American Electric Railway Association is contained in the printed proceedings of the association. As the proceedings will not be issued this year, this paper is publishing the following abstract of the report submitted to the executive committee by Secretary-Treasurer Burritt. The period is for the year ended Oct. 31, 1917, and the publication is made with the permission of the association. The figures for 1916 are included for reference:

INCOME STATEMENT

Revenues	Year Ended Oct. 31	
	1917	1916
1. Admission fees:		
Railway companies	\$70	\$240
Manufacturing companies	70	2,320
Total	\$140	\$2,560
2. Annual dues:		
Railway companies	\$46,093	\$46,148
Manufacturing companies	9,574	6,142
Individuals	3,307	3,979
Total	\$58,975	\$56,270
3. Miscellaneous income:		
Contribution from Hotel Men's Association	\$32	\$3,451
Interest on deposits	519	606
Sale of advance papers, year books and proceedings	377	509
Sale of Engineering Manuals and binders	199	285
Sale of "Cost of Urban Transportation Service"	195	614
Sale of Bibliography on Valuation	20	151
Sale of other pamphlets	247	369
Sale of dinner tickets	5,230	.....
Rent of convention exhibit space .....	.....	19,968
Convention exhibit donation .....	.....	375
Total	\$6,823	\$26,332

(Concluded from page 373)

The opinions and data given were the result of an extensive study of circuit-breaker operation under practical conditions in various parts of the country. It was pointed out, however, that the securing of such data is very difficult owing to the fact that large power plants cannot be obtained for research purposes. Hence it is necessary to depend upon reports of accidental short circuits, and such reports are very considerably affected by the personal element.

However, it was possible to digest the results of observations, and to produce sets of curves between the duration of a short circuit in seconds and the magnitude of the short-circuit current (in terms of full-load current) for different percentages of total circuit reactance. Such curves were termed "system short-circuit characteristics."

The principal contribution of the paper to the knowledge of the subject consists in the furnishing of the characteristic curves, and in the solving of typical problems illustrating their use. The complete set of curves is reproduced on page 373.

The subject of the rating of circuit breakers was very fully discussed and the consensus of opinion seemed to be that the data shown in the curves were conservative, and therefore safe. It was evident that even with the aid of these curves it will not be possible to select circuit breakers without the advice of manufacturers. The state of the art is not yet such to permit this degree of independence on the part of the customer.

Revenues—(Continued)

	Year Ended Oct. 31	
	1917	1916
4. Aera:		
Advertising	\$17,091	\$19,098
Subscriptions:		
Railway companies	3,844	3,820
Manufacturing companies	1,405	855
Individuals	2,202	2,658
Company-section members	1,990	2,320
Non-member	128	167
Sale of extra copies	47	11
Sale of binders	17	6
Total	\$26,725	\$28,937
TOTAL REVENUES	\$92,665	\$114,100

Expenses

American Association	\$49,935	\$74,917
Accountants' Association	1,336	1,153
Engineering Association	4,848	3,480
Claims Association	1,727	1,727
Transportation & Traffic Association	2,334	3,034
Aera	25,683	26,071
Total	\$85,866	\$115,385

EXPENSES BY ASSOCIATIONS

American Association

	Year Ended Oct. 31	
	1917	1916
Salaries of general office staff	\$18,793	\$16,049
Salary and expenses of Washington representative	2,046	416
Rent of office and storeroom	4,542	4,130
Stationery and printing	2,682	2,820
Postage	1,831	2,866
Repairs to furniture and equipment	13	51
Office supplies and expenses	1,168	1,224
Telephone, telegraph and messenger service	1,664	814
Express, freight and cartage	623	627
Exchange	109	103
Traveling expenses of secretary	803	207
Miscellaneous general expenses	1,347	1,169
Advance papers, annual reports and year book	1,526	2,211
Mid-year meeting	618	1,203
Mid-year dinner	5,865	.....
Annual dinner .....	.....	506
Bureau Fare Research .....	.....	870
Engineering Manual	1,659	814
Cost of transportation service .....	.....	1,382
Bibliography on valuations .....	.....	693
Accountant course .....	.....	1,256
Miscellaneous pamphlets	368	18
Annual Convention expenses:		
1915 Convention .....	.....	1,742
1916 Convention	253	5,497
1917 Conference	449	.....
Installation of exhibit, 1916 .....	.....	18,203
Entertainment 1916 Convention	177	.....
Committee expenses	3,389	10,033
Total	\$49,935	\$74,917

Accountants' Association

	1917	1916
Advance papers and annual report	\$524	\$781
Miscellaneous expenses of secretary	28	1
Committee expenses	783	365
Total	\$1,336	\$1,153

Engineering Association

	1917	1916
Advance papers and annual report	\$1,645	\$4,994
Committee expenses	3,193	3,486
Total	\$4,848	\$8,480

Claims Association

	1917	1916
Advance papers and annual report	\$436	\$681
Miscellaneous expenses of secretary	158	150
Hooper-Holmes Bureau	1,063	532
Committee expenses	69	362
Total	\$1,727	\$1,727

Transportation and Traffic Association

	1917	1916
Advance papers and annual report	\$780	\$1,409
Committee expenses	1,554	1,625
Total	\$2,334	\$3,034

"Aera"

	1917	1916
Salaries of Aera staff	\$9,955	\$8,244
Rent of office	678	398
Telephone, telegraph and messenger service	191	157
Postage and express	251	657
Traveling expenses of Aera staff	978	982
Miscellaneous expenses	31	289
Discount on Aera advertising	203	53
Cost of binders	123	.....
Magazine expenses:		
Cost of printing	6,758	11,150
Cost of paper	4,344	2,012
Cost of cuts for text	597	951
Express, freight and cartage	536	470
Mailing charges	693	428
Envelopes for mailing	338	273
Total	\$25,683	\$26,071

Replacing Downtown Special Work

Procedure Followed in Denver to Meet Unfavorable Traffic and Weather Conditions and Complete Work in Shortest Possible Time

By W. L. WHITLOCK

Office Engineer Denver (Col.) Tramway

THE recent work of the Denver Tramway in replacing a grand crossing special work layout at Curtis and Fifteenth Streets, one of the most important corners of the city's business district, called into play the genius of the engineering department in order to cope with the difficulties of the work itself and special problems brought on by unfavorable weather conditions. The work had been delayed because of slow delivery on special work, so that plans laid for doing the work last spring could not be executed until this winter, with the consequent danger of freezing the concrete construction. The fact that the traffic at this intersection averages 176 cars per hour on one street and ten cars per hour on the other during eighteen hours of the day gave rise to a very carefully planned arrangement for

means of 1½-in. Myria heat-treated bolts which made a driving fit. Each one of these squares weighed 5000 lb. and was handled by a special crane car. They were laid on a crossing foundation of a special type built by the International Steel Tie Company, which was supported on crushed rock ballast with a 12-in. concrete slab above the ballast. The rails and the special work construction were electrically welded to the steel ties and to the steel crossing foundations. Continuous rail joints were employed. The entire special work layout was incased in a 1:2:3 mixture of concrete, and Master Builders' hardener was used for the wearing surface which formed the finished paving.

After the special work was assembled in place, surfaced and aligned, the concreting was completed within



HEAVY BOLTED SQUARE CROSSING WITH MANGANESE SIDE BEARINGS—SPECIAL WORK WELDED TO STEEL FOUNDATION—END VIEW SHOWING MANGANESE RISER BETWEEN RAILS FOR FLANGE BEARING

handling each detail of the work so that it might be done as speedily as possible.

It was deemed impractical to attempt to replace the crossing under traffic on account of the frequent headway and the importance of allowing the concrete base for the special work to set thoroughly before placing it in use. For these reasons a special type of temporary track made up in sections was laid along each side of Fifteenth Street, so that this heavier traffic might be continued without rerouting. The cars on Curtis Street were rerouted to avoid this corner.

The old special work was a bolted construction consisting of 72-lb. rail laid on wood ties with approximately 2 ft. of pit run gravel ballast on top of the old cable concrete, which formed the sub-base, and with a top paving of basalt stone block. In the new layout a special bolted construction, using 100-lb. rail, was used. Second-hand 72-lb. rail was cut to length and used in place of wood ties. A few of these ties were drilled for rail clips to hold the track to gage during the preliminary work. The outstanding feature of the special work was the type of square crossing used. It was made up with 100-lb. rail and manganese flange-bearing risers, and exceptionally heavy knee irons bolted together by

eight days, during three days of which no work could be done on account of a heavy snowstorm. In this work the tramway concreting train, which was described on page 628 of the ELECTRIC RAILWAY JOURNAL for Oct. 6, 1917, came in for very effective use by making it unnecessary to store materials along the street, and thereby also avoiding to a certain degree the unsightliness of such a large construction job. The total amount of concrete poured measured 96 cu. yd., and this was accomplished by means of the concreting train in a period of thirteen hours.

The first attempt to concrete the layout was defeated by a heavy snowstorm three hours after the work had begun and the job was promptly called off. The concrete already poured was finished and protected by canvas covering. Unusually cold weather accompanied the storm, and to prevent the concrete from freezing four ten-light clusters of 16-cp. lamps were placed underneath the canvas and energized from the trolley. These gave off sufficient heat to keep the concrete above the freezing temperature.

The weather moderated somewhat in two days and it was planned to complete the concrete work in one shift. To make this possible despite the cold weather a hot-



TRANSFERRING MATERIAL FROM CONCRETING TRAIN TO SERVICE CAR, AND MIXER IN OPERATION, DENVER TRAMWAY

water connection was made in an office 300 ft. from the job and a 1¼-in. iron pipe run to the street intersection with a hose from this point to the concrete mixer. No trouble was experienced in finishing up the concrete and although the temperature dropped to 32 deg. Fahr. the surface water on top of the concrete, where it stood because of the rough finishing did not freeze. Thermometer readings taken of the concrete showed it to be approximately 15 deg. warmer than the air. These were taken at 2 o'clock in the morning and the temperature rose with the coming of daylight. The run of concrete on this occasion began at 1 a. m. and was completed at 10 a. m., with thirty minutes out for breakfast. After the hardener used on the concrete surface had set, a coating of 1 in. of sand was covered over the concrete to protect it from frost. Wetting down was found necessary only once, three days after the concrete was poured.

TAKING CARE OF THE TRAFFIC OFFICER

Previous to concreting, a conduit was run from a pole on the corner to the center of the intersection and an electric plug connection placed there for connecting a portable electric heater. An electric switch was installed on the pole and a heater furnished for the convenience and comfort of the traffic officer at the company's expense.

The publicity department of the tramway company created a great deal of interest in this construction work and succeeded in forestalling criticism because of the delays to traffic and the torn-up condition of the street, by running a series of advertisements in the daily papers at the time this construction work was going on. This publicity work was described in an article in the *ELECTRIC RAILWAY JOURNAL* for Dec. 22, 1917.

Good Results from Coke for Car Heating

The Public Utilities Company of Evansville, Ind., is well pleased with the results obtained in using coke instead of coal for car heating. It is said that the coke keeps the cars well heated, and the trainmen like it better than hard coal, owing to the fact that a coke fire is much easier to start and they get a quicker fire with better results.

During the winter of 1915-1916 the company used 149.94 tons of hard coal at a cost of \$993.08. Last winter the same number of cars were heated with coke at a cost of \$683.84 for 170.92 tons, although the winter was more severe and lasted longer in the spring. No figures are available to express the experience of the company in this regard during the present winter.



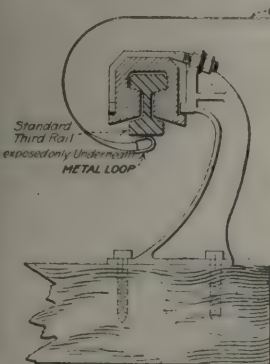
STEEL-RAIL TIES AND SQUARE CROSSINGS IN PLACE AND PAVEMENT AROUND SPECIAL WORK BEING HARD-SURFACED

Even Cloth Tapes Must Be Used with Care on Third-Rail Track

IT IS obvious that the use of metallic tapes along lines using third-rail is dangerous, due to the possibility of contact between the third-rail and the tape, thereby endangering life and possibly causing interruption to service.

Probably it is not as clearly realized that the ordinary cloth tape is nearly as dangerous as the metal. The cloth is not only strengthened by means of wire insertion which becomes exposed with wear, but there is also a metal loop at the end of the tape. Even the cloth forms a good conductor when wet.

The accompanying diagram shows how an accident actually occurred with a cloth tape. In winding up the tape it was jerked from the hands of the man holding the loop end. The free end curled up as it was jerked by the reel and the metal loop came in contact with the third-rail. The tape and the ground were slightly wet, and the result was a 550-volt shock.



CONTACT BETWEEN CLOTH TAPE AND THIRD RAIL

Steel Underframe for Montreal & Southern Counties Railway Interurban Cars

IN the issue of the ELECTRIC RAILWAY JOURNAL for Feb. 16, 1918, page 331, J. A. Wilson, superintendent car department Ottawa Car Manufacturing Company, Ltd., described a new car which has been built for the Montreal & Southern Counties Railway. At the time the article was printed details of the underframe construction were not available, but through the courtesy of the author of the article it is now possible to show

an outline of this construction, as is done in the accompanying drawing.

Sufficient detail is contained in the drawing to render unnecessary further explanation than that given in Mr. Wilson's article.

Magnetic Separator for Screws and Filings

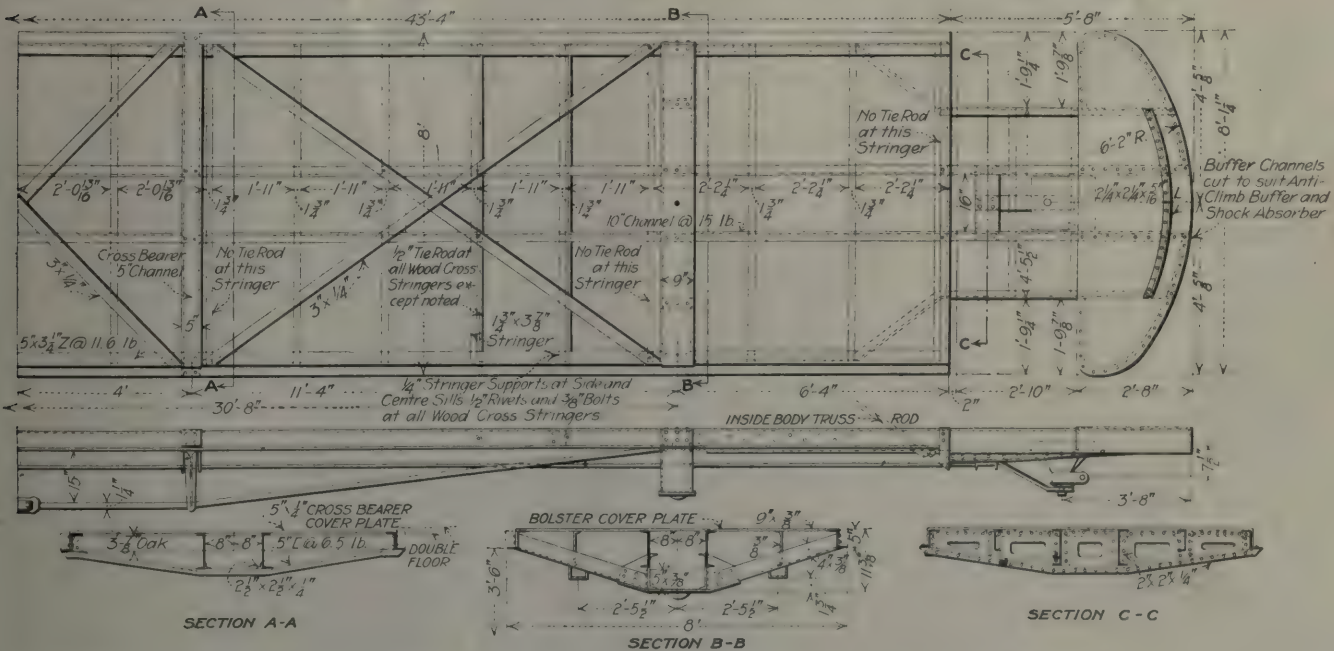
IN THE Wolf Street shops of the New York State Railways, Syracuse, N. Y., a home-made magnetic separator has been giving good service in connection with reclaiming filings and screws. The filings are much more salable when iron and steel are separated from brass, and iron screws can be separated from brass screws much more rapidly with this device than by hand.

The separator consists of a zinc-lined wooden chute of the proportions shown in the half-tone, mounted on the standard at an angle of about 45 deg. with the floor. Suspended over it are two contactor magnets placed so that the poles are about 2 in. from the floor of the chute. The operation of the device consists simply in shoveling the filings or screws into the top of the chute with the magnets energized, when all magnetic material will be held firmly to the poles. By rapping the chute lightly, any brass particles which may have a tendency to be blocked by the iron held fast by the magnet will be allowed to go on their way.

The device has been in use for some months, and has fully demonstrated its practicability. It was built under the direction of F. L. Hinman, master mechanic of the Syracuse lines of the company.



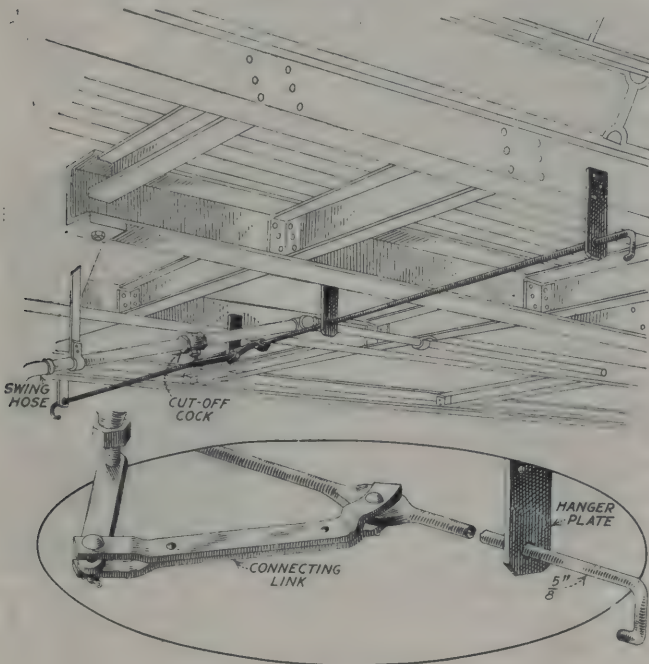
HOME-MADE MAGNETIC SEPARATOR FOR FILINGS AND SCREWS



DETAILS OF UNDERFRAME OF INTERURBAN CAR FOR MONTREAL & SOUTHERN COUNTIES RAILWAY, MONTREAL, QUEBEC, CANADA

Mechanism for Operating Air Cut-Off on Existing Equipment

THE Ohio Electric Railway, Springfield, has equipped several of its interurban cars in train service so that the cut-off cocks can be operated by pulling on a rod from either side of the car. This is both convenient and safe. The valve is placed at some distance in from the end of the car near the center where it will not interfere with



DETAILS OF REMOTE COCK CUT-OFF MECHANISM

the trucks, and to the cock handle is connected a link which is actuated by the cross-rod.

The accompanying sketch shows the details needed. The operating rod used is 5/8 in. in diameter, flattened at one point and bored for attaching the connecting link, and has a length such that the rod handles when pulled over come to within a few inches of the side of the car. The rod is suspended from the car sills by three or four hanger plates as required, made of 3/8-in. x 2 1/2-in. straps and fastened with screws or lags. No general dimensions of the apparatus can be given, because different types of cars would require different material. This device has been approved by the safety committee of the Ohio Electric Railway.

Concrete for Pavement Between Tracks

AFTER an exhaustive investigation for the best type of pavement to be placed between street car tracks, the San Diego Street Railway decided on plain concrete. The chief features of this pavement which led to the decision were that it did not require a large plant for the preparation of the material and that it could be laid by inexperienced labor, thus simplifying the work and making an economical pavement. Consideration was also given to the fact that as this type of pavement supports the head of the rail it tends to eliminate vibration and insures a more permanent pavement.

The pavement used is of 1:2:4 concrete with 1/4-in. expansion joints placed 30 ft. apart. The tie spacing is 2-ft. centers, which allows 16 in. between ties, thus giving a block of concrete of 5 in. in the clear below the

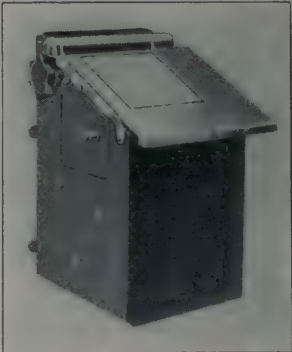
base of the rail for a length of 16 in. With this construction, should the ties fail through decay or other causes, there will still be a good support for the rail.

This type of pavement has proved so satisfactory to the railway and to the city in general that the company is completing 2.3 miles of it.

Improved Train Order Register for Interurban Roads

THE Standard Register Company, Dayton, Ohio, has on the market an autographic train-order register known as the "Kant-Slip" register, the operation of which is quite similar to that of other registers made by that company for purposes where accurate duplicates of records are desired. The distinguishing feature of this register, as expressed in its name, is a provision for very accurate alignment of all the copies made. This consists of holes, punched in the edge of the paper ticket, which are engaged by pins on the feed roller to prevent the tickets from slipping with respect to each other as they are issued.

The register is made for wall mounting and is used either in telephone booths or in the car vestibules. It issues tickets 5 3/4 in. wide and 6 1/2 in. long, which are brought out with one revolution of the feed wheel by turning the knob on the left. Three copies of all dispatches are made, two for the trainmen and one which is rolled up in the register as a permanent record. Each



TRAIN ORDER REGISTER
DESIGNED FOR WALL
MOUNTING

MICHIGAN RAILWAY CO.

SERIAL NO. 50711 191

TO CONDUCTOR AND MOTORMAN: 50711 191

Train No. Motor No. At

Train No. Motor No. At

No. Motor Meet No. Motor At

No. Motor Meet No. Motor At

No. Motor Meet No. Motor At

Dispatcher Train Order No.

CONDUCTOR MOTORMAN TRAIN COMPLETE TIME

SAMPLE "KANT-SLIP" TICKET

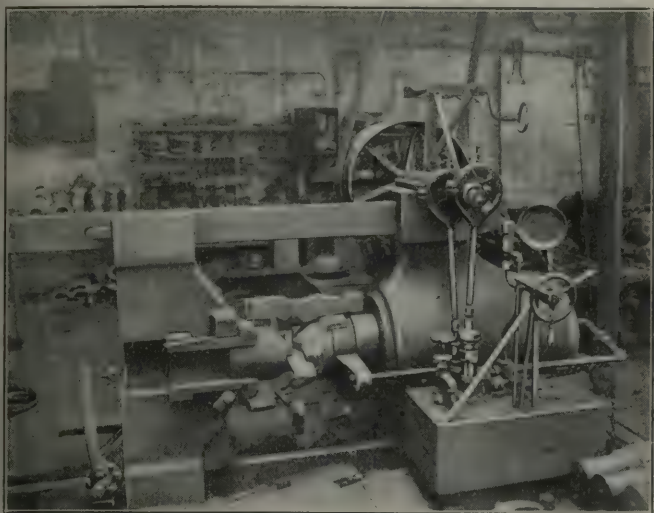
ticket has a serial number stamped on automatically when the ticket is printed.

Among the companies using the register is the Michigan Railway, which has a total of seventy-two installed, and it is said that the registers are giving satisfaction.

Many models of this improved style of register issuing different sizes of forms, for desk use in train dispatcher's office, are also manufactured by the above concern.

Brake Levers Made in Wheel Press

IN THE shops of the Washington Water Power Company, Spokane, Wash., brake levers are shaped in a wheel press which has been provided with cast-iron heads which act as dies. The brake levers are made of 1-in. x 4-in. old iron cut to correct length and heated



WHEEL PRESS USED FOR SHAPING BRAKE LEVERS

to a cherry red heat in a forge before being pressed. The illustration shows the shaping operation and a lever after the shaping has been completed. This practice is not quite as good as the use of a forging machine, but where the latter is not available, the work is done much more quickly than by hand.

Inter-Departmental Co-operation

IN THE present struggle to get the maximum use of every piece of material and equipment and the most efficient management in every respect, co-operation between department heads is essential more than ever before. Frequent conferences at which all the department heads come together and discuss the numerous questions of more than intra-department interest which are constantly arising have proved very helpful.

A number of companies have been following this practice more or less consistently, but perhaps nowhere has it been made a greater success than in Denver. Every Monday General Manager F. W. Hild of the Denver Tramway and all his department heads gather around a big table at the Denver Athletic Club for luncheon. As they eat Mr. Hild addresses the men in turn with the remark, "Well, Dave, what have you today?" or "Ed, your turn next; what have you to bring up?" etc. Very frequently the department heads bring up matters for the decision of the general manager which they were unable to bring to his attention during business hours. When a request of one department head, if granted, would be unfavorable to another department, a plan is found which is mutually satisfactory. In this way not only is friction forestalled but advantage is taken of the judgment of all the men on any matter. When all the men have responded the general manager usually has a few suggestions to make or some pertinent questions to ask particular department heads. The meeting is then open for general constructive criticism.

Mr. Hild and his associates are very enthusiastic over the value of these weekly semi-social conferences. They do not involve much expense and the amount of real work disposed of within the two hours fixed as the duration of the conferences is surprising. The result is a splendid good feeling and a company working as a company instead of as a group of departments.

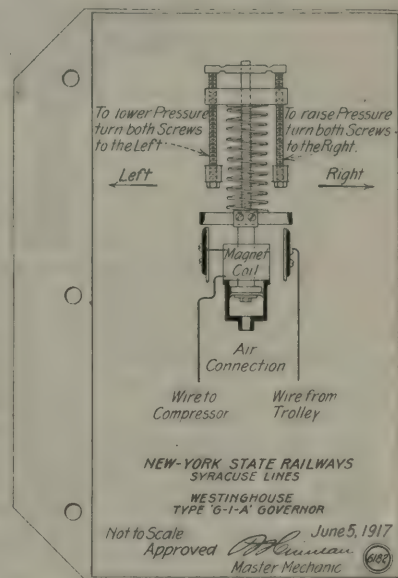
Instruction of Carhouse Inspectors

REALIZING the need for a better opportunity to discuss equipment troubles with inspectors, Frank L. Hinman, master mechanic New York State Railways, Syracuse, N. Y., conducted a very promising experiment during the year just closed. In brief, this consisted simply of a regularly scheduled meeting of the inspectors with the master mechanic once each week.

A special classroom near Mr. Hinman's office was fitted up with blackboards, operating motor, air-brake and miscellaneous equipment, and facilities for handling and operating the apparatus before the group of men, or class if they could be called such. The men reported at the classroom every Friday morning for a period of two hours, for which they received regular pay. It happened fortunately that the men were obliged to come to the neighborhood of the shop to receive their pay at this time, hence were in a position to attend the class without delay. They were all on night duty and lost no working time during instructions.

Each man was furnished with a pocket book of blue-prints, from which a sample is reproduced. These prints formed a partial basis for the instruction. A more important basis, however, was the actual trouble experienced by the men in their routine work. The details of this trouble were presented directly by the men and in addition queries which came in through question boxes placed in the several carhouses were also taken up and discussed. The instructor, Mr. Hinman himself for this first year, also laid out a simple but comprehensive general program to insure the covering of all essential parts of the car equipment.

The 1917 class comprised twelve men, who were all enthusiastic in regard to this practical kind of instruction. The draft early in the fall considerably interfered with the work toward the close, but not until enough had been done to prove the value of the plan. Mr. Hinman found the work very strenuous and hopes when it opens up again to be able to secure assistance. He finds that enthusiasm and conviction as to the importance of the work are essentials to its success.



SAMPLE LEAF FROM POCKET BOOK
FURNISHED TO CARHOUSE INSPEC-
TORS NEW YORK STATE RAILWAYS,
SYRACUSE

Portable Electric Drill and Grinder

PORTABLE electric tools which save time and labor by replacing hand operation increase the output of a given working space. The drill illustrated in Fig. 1 is designed for this purpose. It is equipped with gears to give two speeds and these are changed by means of a knob on the bottom of the gear case. The gears themselves are made of chrome nickel steel and run in grease. Ball bearings are used throughout and

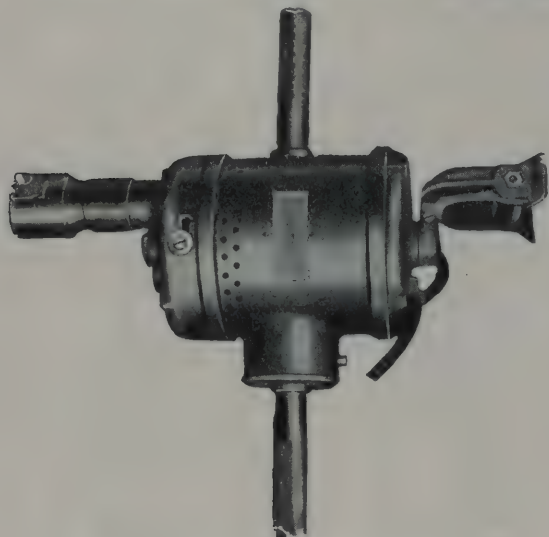


FIG. 1—PORTABLE ELECTRIC DRILL

a $\frac{1}{2}$ -in. Standard chuck and a sturdy electric switch are provided. The speed is 400 r.p.m. on low gear and 700 r.p.m. on high. Westinghouse motors are used in the drills.

The tool post grinder, illustrated in Fig. 2, is adapted for use on lathes. The angle plate can be clamped around the tool post and there is a vertical adjustment on the grinder. The grinder is equipped with a Westinghouse $\frac{1}{4}$ -hp. motor running at 3400 r.p.m. and is

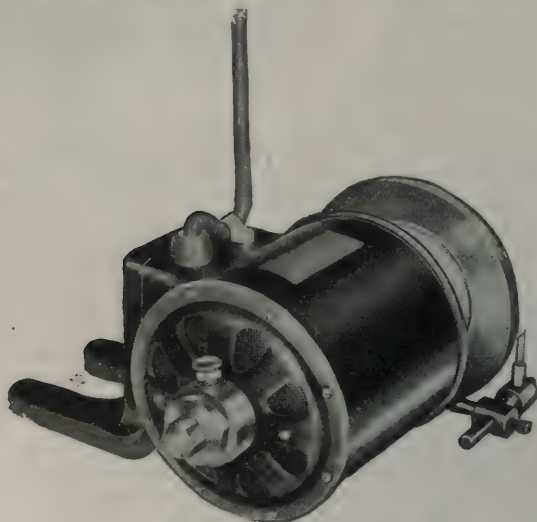


FIG. 2—TOOL POST GRINDER

provided with a 6-in. x $\frac{3}{8}$ -in. grinding wheel, an extension mandrel for internal grinding fitted with a $1\frac{1}{2}$ -in. x $\frac{3}{8}$ -in. wheel, a tooth rest for cutter grinding and an electric attachment plug with $7\frac{1}{2}$ ft. of cord. These two portable electric tools are manufactured by Gillilan Brothers Smelting & Refining Company, Los Angeles, Cal.

LETTER TO THE EDITOR

Axle Failures Are Not All Due to Defects in Manufacture

CAPITAL TRACTION COMPANY,
WASHINGTON, D. C., Feb. 18, 1918.

To the Editor:

The articles by Norman Litchfield, appearing in the last three issues of the JOURNAL, on the subject of car axles, have been very interesting and instructive.

The question of satisfactory axles is so important that it will be unfortunate if these articles fail to bring out valuable discussion from men in charge of equipment on some of the large roads.

The design of axles, as Mr. Litchfield points out, is a most fundamental matter. Considerable work was done along this line by the equipment committee of the American Electric Railway Engineering Association in 1915 and 1916 in an effort to have certain sizes adopted as standard by the Association. It was very unfortunate that so little discussion was brought out at the convention.

While some of the heat-treated axles first put on the market were anything but satisfactory, the treated axle to-day is used very generally. However, to be satisfactory the heat-treated or quenched-and-tempered axle must have good material in it to start with, and the manufacturer must have the facilities properly to do the work. In addition there must be careful inspection to eliminate as far as possible defective material.

As Mr. Litchfield has said further: "The heat treatment merely adds one more step in the production of a high-quality axle." This means that the treating must be properly done, with careful inspection, for if steel is not properly treated it is worse after treatment than if treatment had not been attempted.

The proper method of testing axles has been the subject of much discussion and it is a matter that should be definitely settled. The inspection should be governed by the service in which the axle is to be used, and the program could very properly vary.

The manufacturer is not responsible for all the ills an axle may fall heir to; hence some of the inspection should be done in the railway shop. Furthermore, the importance of care of axles in service cannot be too strongly emphasized. Even after the axle has been received in good order from the manufacturer unless pains are taken in turning it, a well-made axle might become a potential source of danger. This fact cannot be impressed too strongly upon the mind of the lathe man.

Another point is to keep the motor wires away from the axle. I have seen axles that have failed due to spots burned from the motor leads.

Finally, periodical inspection of axles in service is essential. Such inspection should be made with scrupulous care as it is very difficult at times to locate defects that might easily result in ultimate failure of the axle.

R. H. DALGLEISH, Electrical Engineer.

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has completed the work of painting white bands around poles where cars will stop in the future.

News of the Electric Railways

TRAFFIC AND TRANSPORTATION

FINANCIAL AND CORPORATE • PERSONAL MENTION • CONSTRUCTION NEWS

Federal Strike Board Named

Secretary of Labor Wilson Announces the Appointment of Representatives of Capital and Labor

Announcement was made on Feb. 17 of the personnel of the joint conference of employers and union leaders, who will lay down a basis of relations between capital and labor during the war. The first session of the conference will be held in the office of Secretary of Labor Wilson on Feb. 25. The five members chosen to represent each side by the National Industrial Conference Board and the American Federation of Labor will choose two other representatives of the public, making twelve conferees to share in the deliberations, which will cover all phases of the situation.

REPRESENTATIVES OF EMPLOYERS

The representatives of the employers are:

Loyal A. Osborne, New York, vice-president of the Westinghouse Electric & Manufacturing Company and chairman of the executive committee of the National Industrial Conference Board.

Charles F. Brooker, Ansonia, Conn., president of the American Brass Company.

W. J. Vandervoort, East Moline, Ill., president of the Root & Vandervoort Engineering Company.

L. F. Loree, New York, president of the Delaware & Hudson Railroad.

C. Edwin Michael, Roanoke, Va., president of the Virginia Bridge & Iron Company.

REPRESENTATIVES OF WORKERS

The representatives of the workers are:

Frank J. Hayes, president of the United Mine Workers of America, Indianapolis.

William L. Hutcheson, president of the United Brotherhood of Carpenters & Joiners of America, Indianapolis.

J. A. Franklin, president of the Brotherhood of Boilermakers & Iron Shipbuilders of America, Kansas City, Kan.

Victor Olander, representative of the International Seamen's Union of America, Chicago.

T. A. Rickert, president of the United Garment Workers of America, Chicago.

QUESTIONS TO BE CONSIDERED

Among the questions to be considered by the conferees will be the basis for wage determination, strikes and lockouts, piecework prices and price-fixing, method of eliminating improper restrictions on output of war materials from whatever cause, discrimination against union and non-union men, ad-

mission of union agents to plants, method of promptly adjusting disputes at their source through boards containing equal representation of employers and employees, and right of workmen to organize.

Prevention of disturbances, rather than the cure of them, will be the central doctrine of the government's entire policy. Reorganization of the Labor Department will seek to eliminate duplication of effort and conflicting action by various departments in an effort to obviate friction. Where friction arises, the department's adjustment service will endeavor to remove the cause before interruption of production results.

Settlement Conferences Continue

St. Louis Board of Public Service Going Over Terms of Franchise Settlement One by One

The Board of Public Service at St. Louis, Mo., has held two sessions recently at which it discussed the proposed agreement for the settlement of the differences between the city and the United Railways. At the first session the sections ratified by the board were those extending the grant to April 12, 1948, and authorizing the United Railways to lease or purchase the lines of other companies at any time during the term of the proposed franchise; giving the company the privilege of using any present or better method of operating with electric power; authorizing a capitalization of \$60,000,000; compelling the company to submit financial reports to the comptroller and creating the Board of Control.

At the second session the time was given over to an explanation by C. E. Smith, city engineer, of how he had set a valuation of \$60,000,000 on the property of the company. Mr. Smith is reported to have said that the figure was fixed after city officials had heard that the company could be reorganized on a capitalization of \$60,000,000. The company claimed a valuation of \$77,000,000 and Mr. Smith's first estimates placed the valuation at \$70,000,000. The company's total capitalization is about \$104,000,000. Mr. Smith compared his valuation of the United Railways at \$122,000 a mile with the Kansas City valuation of \$112,000 a mile in 1914 and the Chicago valuation of \$107,000 a mile in 1907, when the Kansas City and Chicago systems were in poor condition; with the Chicago valuation of \$150,000 a mile to-day and with an average mile valuation for Chicago, Kansas City, Philadelphia, Milwaukee, Cincinnati, Los Angeles and Denver of \$131,000.

Train Operation for Brooklyn

Commission and B. R. T. Compromise on Car Order Under Discussion Two Years

The Public Service Commission for the First District of New York and the Brooklyn Rapid Transit Company, after public hearings and court appeals, extending over a period of two years to determine whether the company should obey the commission's order to put 250 new surface cars in operation, announced a settlement of their differences on that subject on Feb. 15. The company has agreed to buy fifty trail cars of the "largest practical seating capacity" for use on Flatbush Avenue, Fulton Street and other lines of heavy traffic. The company has also agreed to buy 100 new steel cars for its dual subway lines, and to convert 100 of its center-entrance surface cars for multiple-unit operation, and fifty four-motor cars to serve as leaders for the trailers. Two-car trains are to be in operation in Brooklyn streets within a month.

The original order compelling the operation of 250 more cars said nothing about trail cars, and the dual subway contract required the company to furnish all cars necessary for operation.

A public hearing was set for Feb. 15 on the company's application for a rehearing on the 250-car order, but instead of Timothy S. Williams, president of the Brooklyn Rapid Transit Company, taking the stand as a witness, William L. Ransom, counsel to the commission, described the terms of the compromise. The pending proceeding was adjourned until October, the commission reserving all its rights.

About \$500,000 will be spent for surface cars and \$2,500,000 for other rolling stock.

Short Strike at Alton

The lines of the Alton, Granite & St. Louis Traction Company, Alton, Ill., controlled by the East St. Louis & Suburban Railway, were tied up for about twenty-four hours recently when the employees went on strike. The strike was called as a protest against changes in the schedules which the men thought would work to their disadvantage. After going out, the men added a demand for an increase in pay from 33 to 40 cents an hour. D. E. Parsons, general manager of the company, in announcing the settlement, said the company could not increase the men's pay, but that the old schedule would be kept in force pending an adjustment of the runs, which the company would try to make as satisfactory as possible to the men. The provisions of the settlement agreement were not made public.

Minneapolis Arbitration Award Announced

Summary Is Presented of Findings of President's Mediation Commission in Case Which Caused Sympathetic Strike

The President's mediation commission appointed to adjust labor troubles affecting the Twin City Rapid Transit Company, Minneapolis, Minn., handed down its findings on Feb. 15. The recommendations of the commission are as follows:

1. While competent former employees are available the company should not take men from the farms or war industries.

2. The company should not employ men now engaged in other industries while available and competent men just as skilled are idle.

3. The company should prefer for employment men skilled in the particular line of work over others who have had no training in such line.

4. The company, in returning to work the men who deemed themselves locked out by the company's order, should not discriminate against any of the men because of union affiliations.

5. All the men when put back to work should go back with their old standings.

6. The former employees should offer themselves for reinstatement as rapidly as vacancies occur.

THE COMMISSION'S STATEMENT

The commission states in its report:

"The President's Mediation Commission called the attention of the representatives of the company to the fact that their policy was opposed to the government's war needs that men employed in war industries and in the farming districts should not be removed to non-war industries and that the nation's man power must be used fully and economically by preferring for employment men with training and experience which makes them competent to fill vacancies.

"The company had been previously informed of the effect of local labor disturbances upon industries essential to the prosecution of the war, both in the vicinity and at a distance."

The trouble between the Twin City Rapid Transit Company and its men started in August and September, 1917, over the right of the men to organize. The company conceded this right but, the union men claim, discharged fifty-seven men for alleged activity in the union. The trouble spread until a sympathetic strike in the Twin Cities was called on Dec. 13. This strike lasted only three hours, being called off after information had been received from Washington that the Secretary of War had requested the president of the Mediation Commission then in Seattle to stop off in Minneapolis to investigate the situation there informally. The history of the controversy was followed briefly in the *ELECTRIC RAILWAY JOURNAL* at the time.

Foster Hannaford, general manager of the company, was quoted on Feb. 16 as saying:

"On receipt of the official copy of the report and recommendations of President Wilson's mediation commission this company will give the same most careful consideration, and in the meantime we will be glad to talk with any former employees who are still out of employment and who may come under the scope of the commission's recommendations as reported in the newspapers, and who may offer themselves for employment as vacancies occur. In the absence of President Lowry, who is out of the city, we can make no further statement at this time."

HOW THE REPORT IS REGARDED

The Minneapolis *Tribune* says the report is mainly noteworthy for what it does not contain. For instance, there is not a word on the subject of the right or propriety of the men wearing union or association buttons while on duty. According to the *Tribune*, the whole affair seems to be thrown back on the company, the union and the State for adjustment, the report being essentially a friendly call for harmony and for such employment of available labor as will serve best the interests of the community and the nation.

Praise for Mr. Newton

Constructive Efforts of Railway Manager at Huntington Gratefully Acknowledged by Local Paper

H. S. Newton has resigned as general manager of the Ohio Valley Electric Railway, Huntington, W. Va., to become manager of railways of the Monongahela Valley Traction Company, Fairmont, W. Va. Mr. Newton's four years at Huntington have been unusually successful from the standpoint of better public relations, and his record in this respect has resulted in very candid expressions of appreciation of his work by the newspapers. The Huntington *Herald* said:

ANTICIPATED PUBLIC DEMAND

"Mr. Newton has been general manager of the company for nearly four years, and it is the general public impression that he has performed the functions of his office capably and well. He is an apostle of the best creeds of modern corporations, and he would not tolerate any policy that did not give sufficient consideration to the demands of the public. That attitude won for him much favor with the patrons of the company. He soon became widely acquainted and attained an influential position in leading organizations of the city, such as the Chamber of Commerce and the Rotary Club, in both of which he is a director.

"In all possible ways he has been on the alert to anticipate and meet public demand, whether in the small items

of local service, or in the broader matters of civic development. During his tenure of office the company successfully negotiated a new contract for extension of the lines to southwest Huntington along a line other than Washington Avenue, and for an extension of the company's lines to the Gallia-ville district. Mr. Newton has done much to bring about mutually satisfactory feeling as between the people of Huntington and the company. At the same time the interests of the company have been served in a season when public utilities, particularly electric railways, are having extremely hard sledding."

Elevated Plan for Cleveland

Prominent Business Man Has Advanced Ideas on Rapid Transit and on Fares

J. P. Brophy, vice-president and general manager of the Cleveland (Ohio) Automatic Machine Company, contributed to the magazine section of the Cleveland *Leader* of Feb. 3 an article on how an elevated system would solve the traffic problem in that city. Mr. Brophy said that there was no question that a subway to the city limits was in the distant future. On this account he suggested an elevated road and presented designs of his own for the structure.

He said that the road suggested by him would not cost more than 50 per cent as much as the type of elevated structure in use in other cities and he thought that the design which he advocated would prove more substantial and quieter in every respect. The article was illustrated with line cuts of the suggestions made by Mr. Brophy.

CHEAP FARES BEGET CHEAP SERVICE

Mr. Brophy does not think that all is well with the Cleveland railway situation. He said that the only good thing about the much-lauded 3-cent fare was a little advertising for the city. Three cents from passengers was not enough money to maintain good service. The fact was that the car rider in many instances now tolerated things that before the cheap fare would have been roundly condemned. He said, however, that the 3-cent fare seemed to have the people in its grip notwithstanding the fact that the difference in fare was insignificant compared with the loss of time to people, "waiting, swearing, praying and hoping" for a car to arrive to take them to their destination.

According to Mr. Brophy, service at 5 or 6 cents would be infinitely better for the morning and evening army of riders than an almost intolerable service at 4 cents. Mr. Brophy felt that if a vote were taken it would be found that most of the people favored real accommodations regardless of any slight increase in price. Under the Tayler franchise the service of the Cleveland Railway is under the control of the city through its street railway commissioner.

Favor Municipal Ownership

Senators Advocate Taking Over District Lines for Period of War at Least

Senator Jones of Washington, a member of the special committee which investigated the strike of the employees of the Washington Railway & Electric Company last spring, said on Feb. 8 he would frame a resolution calling upon the Public Utilities Commission to inform the Senate just what is being done, and what, in its opinion, should be done, to relieve the local surface railway situation in the District of Columbia. Senator Jones said that with the report of John A. Beeler to the commission as a basis upon which to work Congress will be able to go ahead with any legislation that may be necessary. He is quoted as follows:

"The railway companies must act to better conditions or the government must act. The companies must provide more cars, or more tracks, or the government must take them over, perhaps only temporarily, just as it has taken over the railroads of the country. The government could take the electric railway lines of the District just as it has the railroads, and guarantee to the owners a fair return for the use of their properties during the period of government control."

Senator Jones pointed out that the problem of municipal ownership of the lines could be settled later. He said that the main thing now was to obtain relief.

Senator Norris of Nebraska vigorously advocated that the government take over the local lines. He is reported to have said:

"It may be necessary to operate a number of large motor buses as auxiliaries to the electric railway lines while you are building more car tracks and buying more cars. Some steps should be taken without delay to relieve the congestion of travel. Plans are being made to handle the housing problem for the thousands of newcomers to Washington, and it is high time that radical steps be taken to make it possible for these people and residents of the District to obtain transportation from their homes to their offices."

Increase for Interurban Men

The Ohio Electric Railway, Cincinnati, Ohio, has issued notice of an increase in wages to motormen and conductors on its interurban cars amounting to 4 cents an hour a man. The increase is made in the form of a war bonus, and it is understood will be continued as long as the conditions justify. The wage scale which has been in effect is as follows:

First year, 26 cents an hour; second year, 27 cents; third year, 28 cents; fourth year, 29 cents; fifth year, 30 cents; sixth year, 31 cents; seventh year, 32 cents; eighth year and after, 33 cents.

The new rate will be as follows:

First year, 30 cents an hour; second

year, 31 cents; third year, 32 cents; fourth year, 33 cents; fifth year, 34 cents; sixth year, 35 cents; seventh year, 36 cents; eighth year and after, 37 cents.

It is not contemplated at the present time to make any changes in wages of motormen and conductors employed on the various city lines of the company as they received an increase in wages last fall.

Beyond the Tunnel

San Francisco Is Considering the Adviseability of Taking Over Private Lines West of Twin Peaks

On Feb. 8 a meeting was held in the office of Mayor Rolph of San Francisco, Cal., of all the city officials interested in the transportation problem west of the Twin Peaks tunnel. At present cars of the Municipal Railway run through the Twin Peaks tunnel to Sloate Boulevard. Beyond this point buses have been provided as a temporary expedient. The Municipal Railway stops short of the most thickly populated area. The United Railroads has lines beyond the tunnel, but is handicapped by lack of direct connection downtown. As a result of the meeting it is expected that the United Railroads will be asked to set a price on its lines beyond the tunnel. In commenting on the result of the meeting Mayor Rolph is reported to have said:

"We decided to approach the United Railroads with a view to having a price set on the part of its system beyond the tunnel. That this was the wisest move just now was the opinion of everybody at the meeting. Engineer O'Shaughnessy for the city was instructed to meet with representatives of the United Railroads and try to work out a method of arriving at a physical valuation of the property involved. To do this would be to apply the principle of the McNab plan, which was the purchase of the entire system. We need only a part of the system. A few months ago the United Railroads indicated a willingness to sell to the city. Whether it still is of the same mind we will now ascertain."

Public Utilities at U. of C.

The University of California is giving an extension course on the subject of public utilities, under the direction of Paul Sinsheimer, formerly stock and bond expert of the California Railroad Commission. The speakers who are to discuss various phases of the public utility problems include George Weeks, president of the National City Company; John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company; Paul Sinsheimer, vice-president of the Union Trust Company; State Railroad Commissioners Thelan, Edgerton, Gordon, Devlin and Loveland, and the following members of the commission staff: Richard Sachs, chief engineer; L. R. Reynolds, chief auditor; Fred O'Brien, recorder, and Douglas Brookman, attorney.

News Notes

Time Extended for Rhode Island Report.—A resolution was introduced in the Legislature of Rhode Island recently, granting an extension of time from Feb. 15 until March 8 to the special commission which was appointed a year ago to investigate the Rhode Island Company.

Increase in Wages for Interurban Men.—Trainmen in the employ of the Galveston-Houston Interurban Railway, Galveston, Tex., have received an increase in wages of 2 cents an hour. The schedule provides a scale ranging from 32 cents an hour for men in their first year's service to 36 cents an hour for men in their fifth year's service.

Hudson Tubes Under Government.—Much ado was made in the newspapers in New York over the discovery on Feb. 20 that the Hudson & Manhattan Railroad, operating tunnels under the Hudson River between New York and New Jersey, had been taken over by the government at the first of the year, under President Wilson's railroad proclamation. The *Times* said that "no official announcement of the move had been made."

Guarantees Minimum Wage.—The United Railroads, San Francisco, Cal., has posted in its carhouses a notice stating that hereafter the company will guarantee extra platform men an average monthly wage of \$75, the adjustment to be made once every three months. The new wage is for extra men who report regularly and accept such runs as are offered them. Platform men on regular runs are not affected by this order.

Increase in Wages in Dallas.—The Texas Electric Railway, Dallas, Tex., has increased the wages of its trainmen. Under the new schedule, interurban trainmen will receive a minimum wage of 27 cents an hour and a maximum of 33 cents an hour, graduated according to length of service. The trainmen on the local lines in Sherman, Denison, Waco and Corsicana will receive a minimum of 22 cents an hour with a maximum of 26 cents an hour.

Car Service Through Twin Peaks Tunnel.—Regular service was established on Feb. 3 by the Municipal Railway through Twin Peaks Tunnel in San Francisco, Cal. The first car left the city hall with Mayor Rolph acting as motorman and T. A. Reardon, president of the Board of Public Works, as conductor. Ceremonies were held when the car reached the west portal. Traffic for several days following Feb. 3 was heavier than is expected to obtain under normal conditions.

Franchise Agreement Approved.—The Legislature of the Province of

Quebec has sanctioned the agreement between the city and the Montreal Tramways as prepared by the Tramways Commission. As suggested in the agreement the Lieutenant Governor in Council will name a special tramways commission of three members to supervise and see that the conditions of contract are carried out as agreed. The terms of the franchise were reviewed in the *ELECTRIC RAILWAY JOURNAL* for Feb. 9, page 288.

Freight Handling Discussed in Chicago.—Freight handling on the surface and elevated lines in Chicago was again considered on Feb. 12 at a meeting of the local transportation committee of the City Council. The preceding session was noted in the Feb. 16 issue of this paper. The truck gardeners showed a special interest in the proposed plan for getting their produce to the central market. The committee referred the whole subject again to the railways to secure their views on the location of terminals, the hours for handling freight and the classes of merchandise to be provided for in an ordinance.

Increase in Wages in Wheeling.—The Wheeling (W. Va.) Traction Company on Jan. 1 increased the pay of its trainmen to the following rates: First year, 32 cents; second year, 33 cents; third year, 33½ cents; fourth year, 34 cents; fifth year, 35 cents; sixth year, 36 cents; seventh year and over, 37 cents. The old rates were: First year, 26 cents; second year, 28 cents; third year, 30 cents; fourth year, 31 cents; fifth year, 32 cents; sixth year, 33 cents; seventh year and over, 34 cents. The new rates are to be effective until the expiration of the present working agreement on April 30, 1918.

Will Discontinue Park.—Owing to war conditions and the high cost of operation, due to increased values of both material and labor, it has been deemed advisable by the West Virginia Traction & Electric Company, Wheeling, W. Va., owners of Wheeling Park, and Messrs. Griffiths and Crane, the lessees and operators, to discontinue the operation of the park. Wheeling Park has been in operation for more than forty years and this will be the first season it will not be used. It was originally the estate of the late Thomas Hornbrook, who later sold it to the railway.

Bill to Take Over Lines to Shipyards.—A bill providing for the taking over of street and interurban railways serving shipyards or plants engaged, or that may hereafter be engaged, in the construction of ships or equipment for such plants, has been favorably reported to the Senate by the committee of commerce. The measure was introduced by Senator Duncan U. Fletcher, Florida, chairman of the Senate commerce committee. The text of the bill is being sent out by the American Electric Railway Association War Board, which adds the comment that there seems to be strong probability that the bill will be enacted into law.

Jersey Commission to Be Increased.—Both the New Jersey House and the Senate have passed the bill to increase the membership of the Board of Public Utility Commissioners of that State from three members to five. When the bill was urged for passage in the House it was pointed out that the commission was deluged with work. There were 441 formal hearings before the board in one year recently. Last year the members were called upon to pass on bond applications for issues representing more than \$200,000,000. In its last annual report the board recommended the passage of a law empowering it to refer some of the cases to examiners to take evidence and report to the main commission.

Urges Franchise Settlement.—An appeal was made recently by Daniel Carmichael, chairman of the central franchise committee of the Joint Improvement Associations of Minneapolis, Minn., for an early franchise settlement by the city with the Minneapolis Street Railway on a fair and equitable basis to prevent "a period of warfare between the public and the company." Mr. Carmichael said: "During the fight figures and terms are proposed by both sides which are merely intended to fool, browbeat, scare or confuse the other party, and usually both sides to the conflict fight through to the point of exhaustion. Meanwhile service becomes demoralized, the equipment is allowed to deteriorate, necessary extensions and additions to equipment and service are refused, and in the end the public as usual pays the price of all the delay."

Short Strike in Kansas.—The trainmen of the Joplin & Pittsburg Railway, Pittsburg, Kan., suspended work at midnight on Feb. 13. They took this action following a lengthy conference with the officials of the company and of the State and federal government, at which efforts failed which had been made toward an adjustment of the differences between the men and the company. J. J. Barrett, federal commissioner of conciliation, attended all meetings between the men and the company, as did P. J. McBride, State labor commissioner of Kansas. The men returned to work, however, after a few hours on the suggestion of Mr. Barrett. The men contended that they were quietly leaving their work and that they would not object to other men taking their places. They are said to have asked for an increase of 18 cents an hour.

Chicago Rapid Transit Ordinance Progressing.—Further discussion of the proposed ordinance for extension of rapid transit facilities in Chicago was carried on before the local transportation committee of the City Council on Feb. 13 and 16. There was considerable debate on the question of giving broad powers to a board of regulation and control. Several of the aldermen agreed with President Busby's suggestion that charges for paving and maintenance of paving, and reconstruction of tracks disturbed for sewer re-

moval, should be eliminated. There has been considerable demand for the removal of the restriction in the present ordinance against the use of trailers on surface lines, and the new ordinance may leave this detail to the board of control. It is expected that when the committee meets again a new draft of an ordinance will be ready for consideration. Many chapters have already been agreed upon by both sides.

Programs of Meetings

Illinois Electric Railways Association

The annual meeting of the Illinois Electric Railways Association has been postponed to a date to be set later. The necessity for the railway members giving their undivided attention to their properties and the pressure of business of many supply men made it inadvisable to hold the meeting at this time. The present officers and members of committees will hold over until the postponed meeting is held.

New England Street Railway Club

The regular monthly meeting of the New England Street Railway Club will be held on Feb. 28 at the Hotel Brunswick, Boston, Mass., at 6 p. m. The subject, "Power Production in War Times," will be discussed by H. H. Stinson, manager of transportation of the New England Fuel & Transportation Company; George E. Wood, mechanical engineer of the Connecticut Company, and W. C. Slade, superintendent of power and lines of the Rhode Island Company.

Central Electric Railway Association

The program has been announced for the annual meeting of the Central Electric Railway Association at the Miami Hotel, Dayton, Ohio, on Feb. 28 and March 1. The session on Feb. 28 will convene at 3 p. m. C. N. Wilcox, president of the association, will deliver the annual address. The business session and the presentation of the reports of committees will follow. The other speaker at this session will be Charles A. Bookwalter, former mayor of the city of Indianapolis. His subject will be "The War."

The session on March 1 will convene at 9 a. m., with the consideration of business and the presentation of the reports of committees first to receive attention. There will follow an address by Charles R. Gillies, Dayton, on "War Savings," and a paper by A. C. Van Driesen, president of the Central Electric Railway Accountants' Association, on "The Work of the Accountants' Association." The annual report of the secretary and treasurer will then be presented and new officers will be elected and installed. Incidental patriotic songs will be sung during both sessions by a quartet composed of members of the association under the direction of J. F. Starkey, general passenger agent of the Lake Shore Electric Railway, Sandusky, Ohio.

Financial and Corporate

Pittsburgh Bondholders Act

Representative of First Mortgage Bond Holders Files Bill Against Philadelphia Company

A bill in equity, on behalf of Benjamin C. Allen, acting for himself and other holders of the first mortgage bonds of the Union Traction Company, Pittsburgh, Pa., was filed on Feb. 15 against the Philadelphia Company, the Pittsburgh Railways and the United Traction Company, Pittsburgh, in the District Court of the United States in the Western District of Pennsylvania. The plaintiff in the suit is a holder whose bonds have been deposited with the committee, of which Thomas G. Gates is chairman, and whose interests are friendly to them.

The bill, after reciting the manner in which the different railway properties in Pittsburgh came under the Philadelphia Company, sets forth in detail the manner in which the Philadelphia Company enjoyed the financial advantages which it derived therefrom and the credit which it thus acquired.

UNDERLYING PROPERTIES NEGLECTED

The bill avers that under the Philadelphia Company the underlying properties have been operated as one system, having a common treasury into which all receipts have gone and from which all payments have been made. The plaintiff states that while thus enjoying the advantages of ownership the Philadelphia Company has failed to keep the underlying properties in proper operating condition or to set aside any fund for replacement, but, on the contrary, has contracted an enormous floating debt, diverting a large amount of revenue to itself by its control in the matter of the purchase of power, etc.

WHAT THE COMMITTEE SAID

A statement by the committee, after reviewing the charges just mentioned, says in part:

"After having dealt with the property and franchises so as to destroy their value apart from the rest of the Philadelphia Company's system, the Philadelphia Company has now failed to provide funds for the payment of coupons, seeking to obtain the benefit of the condition which it brought about, without any liability on its part to the innocent investors whose money originally built the roads.

"The plaintiff, therefore, demands that the Philadelphia Company shall be held by the court liable to pay the interest accrued and hereafter to accrue upon bonds issued by corporations whose property has thus been appropriated, and that the principal shall be decreed to be an obligation of the Philadelphia Company and be charged as a

lien on all of its property until they are fully paid. The bill further asks the court to restrain the Philadelphia Company from permitting further defaults to occur on bonds secured by mortgages upon any of its electric railway properties which might threaten to dismember its system and unfit it for public service by impairing its value as a whole.

"The responsibility for the principal and interest on underlying bonds of the companies which go to make up the Pittsburgh Railway system is thus squarely placed at the door of the Philadelphia Company, and the court is asked to recognize and enforce the liability which the Philadelphia Company, by its recent defaults, has sought to avoid."

Reorganization Operative

The reorganization committee of the Petaluma & Santa Rosa Railway, Petaluma, Cal., has announced that the reorganization agreement of Oct. 25, 1917, has been declared operative and that the trustee for the second mortgage has been instructed to start foreclosure proceedings.

L. B. Mackey, of E. H. Rollins & Sons, Boston, Mass., secretary of the reorganization committee, has addressed a circular letter to the holders of the first and second mortgage bonds and to the stockholders of the company, advising them that all but \$11,000 of the \$655,000 first mortgage bonds and all

Lehigh Transit in 1917

Sixteen Per Cent Increase in Operating Revenue but Slight Decrease in Net Income

In view of the large increase in gross business, in both the railway and the power departments, which had to be cared for at the prevailing high costs of operation, the results of the Lehigh Valley Transit Company, Allentown, Pa., for the year ended Nov. 30, 1917, are said to have been satisfactory. The details of operation for the last two years are given in the accompanying statement.

The revenue from transportation in the last year increased \$304,847, or 15.4 per cent. Power sales gained \$97,411, or 19.7 per cent. The total operating revenue, therefore, increased \$403,201, or 16.3 per cent.

GAINS OFFSET

These gains were slightly more than offset, however, by the increase of \$416,806, or 29 per cent, in operating expenses. Furthermore, the taxes advanced \$19,728, or 23.3 per cent. As a result of maintaining the property at the usual standard, notwithstanding the increase in cost of labor and materials, there was a slight decrease in net income of \$14,939, or 3.1 per cent.

Beginning with 1911 there has been credited each year to maintenance, renewals and depreciation an amount equal to 22 per cent of the gross earnings of the railway lines. All items of maintenance and renewals are charged to this account. The balance is set up to accrued depreciation reserve, which showed as of Nov. 30, 1917, a credit of \$312,279.

The freight and the express business of the company showed a decrease in

	1917		1916	
	Amount	Per Cent	Amount	Per Cent
Passenger revenue	\$2,131,536	74.2	\$1,852,505	74.9
Other transportation revenue	140,759	4.9	115,002	4.7
Revenue from other railway operations	602,718	20.9	504,363	20.4
Total operating revenue	\$2,875,073	100.0	\$2,471,871	100.0
Operating expenses (actual)	\$1,709,326	59.4	\$1,283,339	51.9
Provision for equalization and accrued depreciation	141,145	4.9	150,325	6.1
Total	\$1,850,471	64.3	\$1,433,665	58.0
Net operating revenue	\$1,024,601	35.7	\$1,038,206	42.0
Taxes	104,173	3.6	84,445	3.4
Operating income	\$920,428	32.1	\$953,761	38.6
Non-operating income	144,755	5.0	145,209	5.8
Gross income	\$1,065,183	37.1	\$1,098,970	44.4
Deductions from gross income	611,646	21.3	630,493	25.5
Net income	\$453,537	15.8	\$468,477	18.9

of the \$217,000 second mortgage bonds have been deposited in accordance with the reorganization agreement.

In March, 1917, Rollins & Sons addressed the holders of the first mortgage bonds of the railway, calling their attention to the fact that the sinking fund provisions of the trust deed were in default and recommending that the bonds be deposited with the Mercantile Trust Company, San Francisco, Cal., under a plan which looked to the cancellation of the \$250,000 of second mortgage bonds on condition that the sinking fund payments on the first mortgage bonds be waived.

surplus on account of the inability of the income to meet the rapid rise in operating costs. The surplus of the freight business decreased \$3,206, or 17.5 per cent, and the surplus from the express business fell off \$107, or 1 per cent. The five-year contract with the Adams Express Company, whereby it operated over the company's lines and used equipment furnished by the company, expired on Dec. 12, 1917. The contract was extended for ninety days in order to determine whether or not it would be to the best interest of the railway company to renew the agreement for a fixed period.

Reorganization Fails

Road Between Mexico and Santa Fe, Mo., Not Now in Operation, Likely to Be Junked

The directors of the Mexico Investment & Construction Company have rejected the proposal made to them on Jan. 26 for the reorganization of the company, which operated 16 miles of electric railway between Mexico and Santa Fe, Mo. It was planned to have new interests take stock in the company, and to elect a new personnel to include three of the former directors and then to make a new trial of operation of the road. The proposal was rejected by the present owners for the following reasons:

1. It takes care of only one-third of the debts now due to outside parties, payment of which is being urgently demanded.

2. It makes no provision for the \$30,000 advanced by the stockholders for building the extension from Molino to Santa Fe.

3. It is unreasonable that the owners of an \$80,000 investment should be called on to surrender control to unnamed parties who propose to furnish only \$5,000 of the capital.

It has been decided that in case the railroad is dismantled and the material sold all cash donated for the extension of the line from Molino to Santa Fe, whether legally collectible or not, be repaid in full, or at least in the same proportion that the stockholders are repaid, out of the proceeds of such sale.

Last November it was noted in the *ELECTRIC RAILWAY JOURNAL* that W. W. Botts, secretary and treasurer of the company, had issued a statement in which he said that the stockholders were "forced to the conclusion that unless the road should be wanted as a part of a through line from Hannibal to Mexico, the enterprise is a failure and ought to be abandoned."

Financing Policy Outlined

Chairman of Capital Issues Committee Says Encouraging Support is Being Received Throughout Country

The chairman of the capital issues committee of the Federal Reserve System on Feb. 17 stated that the support received from all parts of the country was most encouraging. This committee was appointed to act upon voluntary application for permission to issue new or refunding securities.

In dealing with applications thus far submitted, the committee has adopted the policy that whenever the application involves the renewal of maturing obligations, such renewal should be favorably considered unless there are particular reasons to the contrary. A similar policy is being adopted in dealing with the funding of banking debt incurred prior to Feb. 1, 1918.

In dealing with bonds to be issued for the purpose of new road construction, the committee has been moved primarily by the consideration of whether or not these roads are of im-

portance either from a military or economic point of view and whether or not results, through the new construction, may be expected to be obtained approximately within the present year.

In passing favorably upon certain projects involving the production of electric power, the committee was guided by the fact that the amount involved was small as compared with the funds already hazarded in such undertakings, and by the fact that the power to be produced was required primarily for purposes connected directly with the successful prosecution of the war.

The advisory committee of the capital issues committee has been in close touch with all local committees established by the twelve Federal Reserve Banks, and all personal presentations of applications are being made to them.

Receivership Denial

Summary of Defense of United Railways, St. Louis, Mo., to Receivership Application

The application for the appointment of receivers for the United Railways, St. Louis, Mo., has been denied. Judge Dyer of the United States District Court concluded that the defense was correct in its contention that the allegations contained in the application did not justify a receivership and showed no cause for action. These facts were noted briefly in the *ELECTRIC RAILWAY JOURNAL* for Feb. 16, page 338. The answer, filed by attorneys for the United Railways and others interested, maintained that the facts as outlined in the bill of complaint did not constitute a valid cause for action and that the United States District Court seemed to be without jurisdiction. Another allegation was that the complainant did not state who were the directors of the defendant company, nor that he ever appealed to the directors to give him redress for his alleged wrongs. Seven grounds on which dismissal of action was asked were as follows:

1. The bill of complaint does not state facts sufficient to constitute cause of action.

2. The United States Court appears to lack jurisdiction.

3. The bill of complaint is multifarious, and violates the equity rules, in that it does not assert that all the defendants are equally liable.

4. The bill combines alleged causes of action in equity with alleged causes at law.

5. The bill does not show that the plaintiff has complied with the rules of equity, in that he has not exhausted his rights within the corporation to correct his alleged wrongs; the bill does not show who the company's directors are, or that the plaintiff ever applied to the directors for redress, or that such an appeal, if made, would have been without result.

6. Plaintiff's right of action appears to have lapsed, if any such right existed.

7. The causes of action are barred by the statute of limitations.

Financial News Notes

Authorized to Junk Part of Line.—The Public Service Commission of Indiana on Feb. 15 authorized the holders of the bonds covering that part of the Gary & Interurban Railroad connecting Gary and Valparaiso to dismantle the property and to dispose of it as junk.

Sale Set for March 14.—The property of the Selma Street & Suburban Railway, Selma, Ala., will be sold on March 14 under foreclosure to satisfy a mortgage for \$125,000 said to have been executed to F. M. Abbott, J. Waters and D. L. Gerould, Warren, Pa.

Danbury & Bethel Street Railway, Danbury, Conn.—J. Moss Ives, receiver for the Danbury & Bethel Street Railway, has petitioned the Supreme Court for permission to borrow \$75,000 on receiver's certificates to liquidate outstanding obligations and provide for improvements, including new cars.

Several New Directors Elected.—At a recent meeting of the Philadelphia & Western Railway, Upper Darby, Pa. W. Barklie Henry, Edward F. Beale and Charles H. Bean were elected directors to fill vacancies caused by the death of Edward B. Smith and the resignations of G. R. Sheldon and G. T. Hollister.

Reserve Board Asked About B. R. T. Notes.—The Brooklyn (N. Y.) Rapid Transit Company has applied to the capital issues committee of the Federal Reserve Board with respect to the steps to be taken by it looking toward providing for its \$57,735,000 of secured 5 per cent notes, which mature on July 1.

New Officers for Fort Smith.—New officers have been elected for the Fort Smith-Oklahoma Light & Traction Company as follows: R. E. Ballard, formerly auditor of the company, president and general manager, to succeed W. J. Parker; George Sengel, Jr., formerly treasurer of the company, secretary, to succeed J. F. MacGilvray, and R. D. Beard, treasurer.

New Officers for Selma.—New officers have been elected for the Selma Street & Suburban Railway, Selma, Ala., as follows: Robert Wetheril, president, to succeed Joseph S. Keen, Jr.; W. H. Roth, secretary, to succeed H. B. Hodge, who has been appointed treasurer to succeed George M. Bunting, and A. H. Knean, general manager, to succeed James H. Dawes. The proposed foreclosure sale of the property is noted elsewhere in this column.

Directors Absolved.—The Court of Appeals at Albany, N. Y., on Feb. 5 affirmed the decision of the Appellate Division dismissing the suit brought against August Belmont. The decision in effect holds that Mr. Belmont and others did not enter into a conspiracy with the original directors of the Interborough Rapid Transit Com-

pany to issue \$1,250,000 of stock in order to divide the same among themselves.

Upset Price of \$1,700,000 Fixed.—The court has fixed \$1,700,000 as the upset price for the property of the Northern Electric Railway, Chico, Cal., at foreclosure sale. It is said that the question still remains of settling the matter of priority of certain bonds of the Chico Electric Company. A special master will be appointed by the court to conduct the sale as soon as the question of the rights of the holders of the securities of the Chico Electric Company has been passed upon.

Appeal of Abandonment Case Dismissed.—The Ohio Supreme Court has dismissed the case of the village of Bellbrook and citizens of Green County against the Dayton, Springfield & Xenia Railway. The case involved objections to the abandonment of the company's branch to Bellbrook, which the Public Utilities Commission approved some time ago. The ground for the dismissal was the fact that the objectors did not ask for a rehearing before the commission, as provided by law.

Preferred Stock Being Offered.—Thomas C. Perkins, Inc., Hartford, Conn., is offering at par, \$100, with a bonus of 20 per cent in common stock, a new issue of \$375,000 of 7 per cent cumulative preferred stock of the Southern New York Power & Railway Corporation, Cooperstown, N. Y., of which \$500,000 is authorized and issued. The common stock authorized and issued is \$774,900. The company has authorized an issue of \$5,000,000 of bonds, of which \$1,133,000 is outstanding at the present time.

Court to Confirm Dan Patch Sale.—It was announced that a court order would be issued on Feb. 23 by Judge Booth of the federal court confirming the sale of that portion of the line of the Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Company extending from Auto Junction to the Luce line junction, to a committee representing the collateral note holders. The sale was made on Dec. 18 to C. T. Jaffray, A. B. Jackson and R. B. Marchant, the committee, at the upset price of \$100,000, with the privilege of dismantling and selling the physical property and right-of-way.

1917 Seattle Municipal Loss.—The Seattle Municipal Street Railway was operated during the fiscal year 1917 at a net loss to the city of \$34,958, according to the annual report of Superintendent of Public Utilities, A. L. Valentine. The report shows that the loss on Division A was \$26,458 and on Division C

\$8,480. Passenger revenue on Division A amounted to \$25,097, and the total revenue obtained from the line was \$28,081. The operating expense for the year was \$54,539, this including an item of \$19,125 as interest on the funded debt. Revenue on Division C amounted to \$24,521, and the operating expense totaled \$33,001.

Tax Tender Rejected.—The finance committee of the City Council of Seattle, Wash., recently recommended the rejection of the offer of the Puget Sound Traction, Light & Power Company to pay about \$74,000 of gross earnings tax for 1917 under the same conditions that a tender for 1916 was made one year ago. The offer to pay the amount was made by the company with the understanding that it would be returned in the event the company is successful in the litigation started to obtain relief from certain franchise obligations, including the payment of 2 per cent tax on gross earnings and the paving of rights-of-way.

Detroit Net Falls Off.—At the annual meeting of the Detroit (Mich.) United Railway the report for the year just ended was made public. The statement shows that gross earnings from operations for 1917 were \$17,427,940, an increase of \$1,391,270. The operating expenses, however, increased to \$13,259,791 in 1917 by an amount of \$2,043,988. Income from other sources increased from \$351,335 in 1916 to \$411,737 in 1917, making gross income \$4,579,886, compared with \$5,172,202 the preceding year. The net income was \$2,175,531 in 1917 and \$2,880,792 in 1916. R. W. Martin, of New York, was elected to the board of directors.

Little Rock Company Issues Notes.—The Interstate Trust & Banking Company, New Orleans, La., is offering at 97½ and interest to yield more than 7¼ per cent \$600,000 of two-year 6 per cent gold notes of the Little Rock Railway & Electric Company, Little Rock, Ark., dated Jan. 1, 1918, due Jan. 1, 1920. The notes are a direct obligation of the company issued to provide for the payment of \$400,000 of notes, which matured on Dec. 1, 1917, temporarily refinanced by banks, for extensions and equipment, and to provide for the contract with the government for light and power purposes at Camp Pike, about 10 miles from Little Rock.

Reprints of Bond and Tax Tables Ready.—First National Bank, Cleveland, Ohio, is distributing reprints of the tables on liberty bond and federal income tax data, prepared by C. H.

Hubbell, formerly auditor of receipts, Illinois Traction System, and mentioned on page 256 of the issue of this paper for Feb. 2. Upon request, the bank will mail copies to any address without charge. The bank also announces that if and when new issues of Liberty bonds are offered, the tables and statements will be revised to cover such new issues and copies of the revised circular will be mailed to a list made up of the names of those persons who may have asked to be supplied with copies of the original circular.

San Francisco Municipal Earnings Summarized.—The total receipts of the Municipal Railway, San Francisco, Cal., for the period from Dec. 28, 1912, to Dec. 31, 1917, were \$7,421,551. Of this total, the operating revenues were \$7,397,643. These figures are from a statement just issued by the bookkeeping department of the Board of Public Works. The disbursements during the period above mentioned amounted to \$5,567,354. After miscellaneous transfers of \$599,367 and reserve fund transfers of \$767,061 for depreciation and \$25,396 for injury insurance, there remained a surplus of \$462,371. Of this, \$144,279 is said to be available for future use, the remainder being intended for the completion of certain new construction. The depreciation fund at the end of 1917 contained \$547,643 of bonds and \$274,581 of cash, and the injury insurance fund had \$25,396 of cash.

Nashua Lease Rejected by Receiver.—John A. Fisher, president of the Nashua (N. H.) Street Railway, has been notified by Receiver Donham of the Bay State Street Railway that he will not adopt the lease of the Nashua Street Railway, but will turn the property back to its stockholders. In 1900 the Nashua Street Railway conveyed all its property to the Lowell & Suburban Street Railway under lease for ninety-nine years. The lessee agreed to pay as a rental all operating and general expenses, interest on debt and the present 3 per cent net semi-annual dividends. This lease has been owned by the Bay State Street Railway for some time, but on Jan. 1 that company defaulted in the payment of the dividend. In a statement to the stockholders, Mr. Fisher says that he has been informed by counsel that a receiver has the power to turn leased property back, but he is likewise informed that the company will have a claim for damages. He expects shortly to receive more definite information and will then call a special meeting of the stockholders for their consideration and action.

Electric Railway Monthly Earnings

**ATLANTIC SHORE RAILWAY, SANFORD, ME.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '18	\$10,832	\$12,994	\$2,162	\$484	\$1,678
1 " " '17	22,902	23,974	1,072	668	\$404

*Includes taxes. **On May 1, 1917, the Atlantic Shore Railway was divided east and west of York Beach, Maine, the western end passing to the operating control of the Portsmouth, Dover & York Street Railway. Figures for the first four months of 1917 are for the entire system. Beginning with May 1, figures for the Atlantic Shore Railway, as at present constituted, are given. †Deficit.

HUDSON & MANHATTAN RAILROAD, NEW YORK, N. Y.

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Dec., '17	\$586,540	\$280,350	\$306,190	\$218,153	\$88,037
1 " " '16	550,125	229,796	320,329	215,656	104,673
6 " " '17	3,159,044	1,541,200	1,617,844	1,307,077	310,767
6 " " '16	2,947,133	1,313,980	1,633,153	1,290,789	342,364

PHILADELPHIA (PA.) RAPID TRANSIT COMPANY

Period	Operating Revenue	Operating Expenses	Operating Income	Fixed Charges	Net Income
1m., Jan., '18	\$2,468,899	\$1,574,727	\$894,172	\$813,677	\$80,495
1 " " '17	2,427,737	1,385,416	1,042,321	813,804	228,517
7 " " '18	17,499,357	10,391,914	7,107,443	5,681,042	1,426,401
7 " " '17	16,284,933	9,089,236	7,195,697	5,701,037	1,494,660

Traffic and Transportation

Portland Case to Court

Council Appeals to Circuit Court for Relief from Six-Cent Order of Oregon Commission

The complaint of the City Council of Portland, Ore., against the recent 6-cent fare order of the Public Service Commission to the Portland Railway, Light & Power Company has been filed in the Circuit Court. The first point in the complaint is based on the technicality that the State was not a party to the order of the commission setting aside the 5-cent fare. The second point sets forth that the people of Portland in 1913 enacted the commission charter, in which are minute provisions pertaining to the regulation of public service companies, including machinery for fixing the fares, and that the public service commission act exempts from the jurisdiction of the public service commission laws and regulations enacted by the voters in communities under the initiative. The third contention is that the commission order violates the constitution of the State and of the United States by impairing the obligations of the franchise contract. The fourth point contends that there was no allegation in the complaint of the railway and nothing in the proceedings in the case to show that the city's regulation of rates has become unreasonable. The fifth contention is that the order of the Public Service Commission violates the home rule amendment of the State Constitution. The complaint asks that the Circuit Court vacate and set aside the order of the commission.

ANOTHER APPRAISAL PROPOSED

The City Council has passed an ordinance providing for an immediate and independent appraisal of the property of the company used in the railway service, to determine the amount the company has invested and the return derived under the 6-cent fare. The sum of \$30,000 was appropriated to cover the cost of the appraisal. This will be the third appraisal of the company's properties. The first was made by engineers and accountants employed by the company. An appraisal by the State followed, in which the company's figures were cut down materially.

A signed statement has been issued by members of the committee representing the various civic organizations of the city protesting against the city's action in taking appeal from the ruling of the Public Service Commission. The members take the view that such an action will be futile. Instead of resorting to litigation, the committee proposes constructive relief.

Frank J. Miller, chairman of the Public Service Commission, in a recent statement, pointed out that the City

Council should bear in mind that the Council has two remedies of its own for the solution of the 6-cent fare problem, viz., the enactment of an ordinance fixing the fare for Portland and municipal ownership. He states that the law provides that "no ordinance or other municipal regulation shall be reviewed by the commission under the provisions of this section, which was, prior to such review, enacted by the initiative or which was, prior to such review, referred to and approved by the people of said municipality, or while a referendum thereon is pending."

Chairman Miller expressed the opinion that under the provisions of this section the city of Portland can pass an ordinance fixing fares within the city limits, thus removing the matter from the jurisdiction of the commission.

Fare Request in Kansas City

Kansas City Railways Seeks Increase in Fares to Meet Extraordinary Conditions

The Kansas City (Mo.) Railways has filed a petition with the Public Service Commission of Missouri asking a readjustment of fares. The company is not making a specific request for a 6-cent fare, but is pointing out the necessity for a larger income in order to maintain service at the desired standard.

The company's petition is divided into four sections. In the first it recites its ownership of the properties. In the second it reviews how the new franchise under which the company operates is of mutual advantage to the public, the city and the company. In the third it refers to the starting of the war and then takes up the burdens which that conflict has inflicted upon the company.

INCREASED EXPENSE OF \$1,300,000

In the third section the company says that for the year which will end on July 14, 1918, solely on account of extraordinary war conditions, there will be at present prices an additional expense to the company over the previous year of more than \$1,300,000. Of this increase \$400,000 will be accounted for in the advance in the price of coal. The company says that "at a fare limited to 5 cents it will be impossible so long as such extraordinary conditions obtain to give to the city and those interested the full advantages of the franchise provisions of an up-to-date electric railway in a rapidly growing community." It says that "the relief now sought is, therefore, temporary in nature, to continue only so long as the commission shall determine to be necessary to meet the present abnormal situation."

In the fourth section the company re-

fers to the clauses of the franchise that expressly provide for preserving the rights of the State, and then makes its plea as follows:

"To the end, therefore, that neither the company nor the public may be crippled by the said unforeseen and extraordinary increase in expense, an appeal is hereby made to the commission to make a reasonable increase in fares upon such conditions as may be fair and just in view of the changed conditions aforesaid, retaining control and supervision of any additional revenue collected, to the end that it shall be applied solely to the payment of the increased expense hereinbefore mentioned, necessary to be paid to render first-class service."

City of Trenton Answered

Trenton Company Places Blame On the City for Any Deficiencies in Its Service

The Trenton & Mercer County Traction Corporation, Trenton, N. J., has filed an answer with the Board of Public Utility Commissioners of New Jersey to the application of the City Commission of Trenton, asking that the company be required to improve its system by making certain of the changes suggested in the recent report of Peter Witt.

The company states that there is very little the matter with the rolling stock, trackage and service furnished. It makes another appeal for the abolition of the six-for-a-quarter tickets in the city of Trenton.

OPPOSED TO ONE-MAN CARS

The recommendation of Mr. Witt that the company purchase fifty one-man cars is declared by the company to be impractical. The company contends that the type of car recommended requires greater time to load and unload, and that its seating capacity is only 70 per cent of that of the double-truck cars now in use. The company denied that cars are not kept in good repair. In its plea for relief from the six-for-a-quarter tickets the company points out that a straight 5-cent fare is the rate obtained by electric railways elsewhere in the State.

The city is cited as being responsible for doubling the taxes of the company and for securing the indictment of the directors for maintaining poles and lines of wires necessary for the operation of its property under franchises granted by predecessors of the City Commission. Other acts of the city are reviewed to show how the company has been hampered in giving the service which it hoped to give at the time it leased the local system and began the work of rehabilitation and improvement. The company says that to make the improvements asked for in the petition of the City Commission would cost more than \$800,000. It denies that the commission has power to direct the company to make the changes and improvements prayed for by the city.

Navy Yard Traffic Problem at League Island

Philadelphia Rapid Transit Company Beset by Conditions Beyond Its Power to Control

Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, assisted by Herbert G. Tulley, superintendent of transportation, and a corps of assistants, was at the terminus of the League Island Navy Yard, Philadelphia, on Feb. 12, at 6.15 p. m., when the greatest number of workmen leave the yard for their homes. Their purpose was to study at first hand the problem involved in transporting the 9000 workers. The cars arrive on two tracks, so that men taking one line all enter on one track and those going in another direction enter the cars on the other. On the evening of Feb. 12 the experiment was tried of having a conductor or extra fare collector at the rear door, which was opened as each car arrived, as well as the front doors, so that fares were collected at either end as the men entered. It is said that the double-end loading proved a success, and is to be permanently established during the rush hours.

Mr. Mitten stated very frankly to the newspapers that the problem involved is not entirely within the power of the company to correct. The company is handicapped greatly by delays to its cars caused by traffic on the streets and is also beset by the vicissitudes of securing delivery of materials from the manufacturers upon whom it depends for equipment and supplies. Mr. Mitten is reported to have said:

SOME OF THE COMPANY'S PROBLEMS

"The only help that the company can give is to see that the cars are operated upon a schedule that can be maintained. We do not object to criticism, but when every line in the country is affected by the bad weather, on top of our inability to get materials, so that we have 350 cars tied up in the car-houses, the company feels that it ought to have a chance. Mayor Smith has ordered that the police see that teamsters do not drag or delay cars, and I feel that the service this evening already shows the effect. When the weather was severe, teams could not turn out of the car tracks with ease, and this caused much trouble.

"We have had priority orders for equipment for months, but they do not help us to get materials. Ammunition is the priority order. We as a public service corporation are classed as 'B-3,' and there are classes ahead of us that claim priority orders. What I want the government to do, and will ask Admiral Peoples to get for us, is to order a plant making wheels, axles and other equipment for trolley cars, to fill our orders. Then we can put 350 cars back on the streets. They are now laid up for repairs.

"We got our wheels from the Midvale Steel Works, but the company dismantled its car-wheel plant and is making war materials. The Carnegie Steel Company has our order for axles and wheels. But we cannot get it filled

without an order from the government. We have been buying axles at a St. Louis plant, when we found that they had them, and they forward a few at a time by express, so as to hurry them, but we could only get a few. If we can get the materials we will have the men to put them on the cars."

As noted recently in the *ELECTRIC RAILWAY JOURNAL*, arrangements have been perfected by which 100 large cars are under construction for the railway at the works of the J. G. Brill Company in Philadelphia. This has been done through the instrumentality of the United States government, as the cars are to be used for Hog Island service.

I. T. S. Ad Campaign

600-Mile City and Interurban System Tells the Public About Its Problems

The Illinois Traction System, Peoria, Ill., is running in the various daily papers of towns and cities served by the companies that it controls a series of advertisements headed, "Our Problems Are the People's Problems." The company is showing how the increased costs of production and operation in all lines of business weigh especially heavily upon the utilities, inasmuch as

Our Problems Are The People's Problems

Introductory to a frank statement of fact from your street railway company

This company believes in the policy of informing the public of the facts and conditions concerning its operation.

Recent events of world-wide importance with which all of us are familiar have produced an abnormal condition in every avenue of trade and endeavor.

This is especially noticeable in the public utility industry, where remedies for existing extraordinary conditions have not been readily available as in other lines of trade.

The situation confronting the public utility companies in Illinois, and particularly in this immediate territory warrants the necessity of our present concern.

The prosperity and well-being of a city depends upon the success of its individual enterprises.

We believe the people of this community are interested in the problems of public service and the endeavors of its public utilities to solve these problems to the best interests of all.

With the thought in mind that OUR PROBLEMS ARE THE PEOPLE'S PROBLEMS we will in succeeding issues of this newspaper point out the effect of present day conditions upon one of your important industries.

Peoria Railway Company

they cannot increase their revenue without sanction from the regulatory bodies appointed by the state officials elected by the public direct. Two recent examples of advertising by the company along the lines just mentioned are reproduced herewith. These advertisements were published in the name of the Peoria Railway Company. Since the advertising campaign was started the company has carried its case for some of the properties to the commission, with the results noted elsewhere on this page.

I. T. S. Fare Hearing

Report of Comptroller of Currency Quoted to Prove Need of Utilities for More Revenue

After an all-day session on Feb. 19 the hearing before the Public Service Commission of Illinois on the petition of the Illinois Traction Company, Peoria, for increased rates for city railway service as well as for electric lighting and gas service, was adjourned until March 5. Henry I. Green, attorney for the fourteen petitioning companies, presented exhibits consisting of financial statements taken from the monthly reports of the companies. He also reviewed increases in rates granted elsewhere with opinions of the various commissions.

The figures which were presented were compiled especially to avoid the necessity of an extensive investigation to determine the need for more revenue so that emergency relief could be obtained. The company said it faced ruin unless such relief were obtained. The annual report of the Comptroller of Currency, referred to in the *ELECTRIC RAILWAY JOURNAL* for Feb. 9, page 292, was cited to show that many utilities need immediate help. Evidence was introduced to show that materials used by utilities cost at present four times pre-war prices.

H. E. Chubbuck, vice-president executive of the company, testified to the effect of increased costs for supplies on operation and efficiency.

Our Problems Are The People's Problems

The high cost of living is a serious matter for all of us

Time was when the "high cost of living" joke was a favorite theme for the cartoonist and professional jester. It seldom failed to produce a laugh from those of us who thought that somehow, sometime, things would change, the advancing cost of commodities would cease, the cost curve would start downward again and normal prices would be restored.

Then came the world war, with accompanying increase in demand for all commodities, congestion in all trade channels and resultant added increases in prices.

The high cost of living has ceased to be a joke. It is a serious matter. It is a serious matter for the housewife, for the merchant with whom she trades, for the wholesaler, the jobber, the manufacturer, and for everyone all along the line who has to do with making and distributing the things that enter into the daily life.

This era of high prices is a serious matter for your utility company. This is particularly true because to date there has not been afforded the advantage of protection from mounting costs that has been provided in other lines of business.

Today your street car company faces a problem more important than any it has ever had to contend with. This problem is not ours alone. It is likewise of vital importance to this community.

In succeeding articles we will show what the high cost of living is doing to this company.

Peoria Railway Company

Objectors urged against a blanket order and suggested that each company receive a separate hearing. Some, however, asked only that the present rates be resumed when conditions again became normal. To this the companies are willing to agree.

To avoid delay the commission will make a short investigation and if the proposed rates seem to be justified some measure of relief will probably be granted, such approval to be for a definite time and the commission to keep the case under its jurisdiction.

Appeal for More Revenue

Application Made to the Commission by the United Railways, St. Louis, for Fare Advance

The United Railways, St. Louis, Mo., has appealed to the Public Service Commission of Missouri for an increase in fares. Among the suggestions of the company are that it be permitted to curtail the present transfer privileges or charge for transfers. In a statement which he issued, Richard McCulloch, president and general manager of the company, reviewed the problems that confront the electric railways in war time and pointed out some of the measures of relief extended to companies elsewhere in the United States by the regulating bodies. In conclusion he said:

"At the present time a nickel will buy only one-fifth to one-half of what it would purchase in railway supplies two years ago. The history of the nickel car fare is virtually the same all over the country. The electric railways have constantly installed better cars, made faster and longer trips, and issued more and more transfers. In the old horse-car days companies made a profit on the 5-cent fare. At present not 10 per cent of the electric railways in the United States show a profit."

It is said that the commission will take no action in the matter until counsel for the company and the city authorities have agreed upon a date for a preliminary hearing on the application.

The city is expected to oppose the application of the company through City Counselor Daues.

More Service for Munition Workers

Co-operation of Federal Authorities With Electric Railways Reported in Several Cities

In at least four cities departments of the federal government have recently taken an active interest in the service of the local electric railways. This interest is based on the desire of the government to improve the service for workers in munition plants or other factories engaged on government work, and is in addition to one or two other instances reported earlier, as at the Fore River Ship Building plant with the Bay State Street Railway.

In Philadelphia arrangements have been perfected through the instrumentality of the United States government by which 100 large cars are under construction at the Philadelphia works of the Brill Company to be used by the Philadelphia Rapid Transit Company in its Hog Island service. This statement was made officially by President Mitton on Feb. 7. The details of the financing have not been made public. In the meantime, Rear Admiral Tappan, commandant of the Navy Yard, has asked the Mayor of the city to have the jitney ordinance rescinded so that jitney service may be restored along Broad Street to relieve the congestion at League Island.

Another city in which the government is interested through the needs of munition plant workers is Pittsburgh. According to the daily papers one or more conferences on the subject of more transportation in Pittsburgh have been held by federal officials, and Secretary of the Navy Daniels is reported to have declared to a committee representing the Pittsburgh Commercial Club at a meeting in Washington that if necessary the navy and war departments, acting jointly, would commandeer enough cars to give the service desired. Much of the complaint of inadequacy was made during the severe weather of the first week in February.

Another company with which the government is reported to have arranged for an increase in service is the Tri-City Railway & Light Company, Davenport, Ia., and East Moline, Ill., in connection particularly with concerns engaged on government contracts in the latter city. The additional service is said to have been arranged through the Housing Committee of the Ordnance Department.

In Buffalo a survey was recently made of the possibilities of additional service to some of the plants engaged in airplane construction. An account of this investigation, conducted by B. J. Arnold, was mentioned in the *ELECTRIC RAILWAY JOURNAL* for Feb. 2.

Agree on Beeler Stops

Washington Operation Shows 3 M.P.H. Improvement in Schedule Speed of Capital Traction Lines

Measures have already been taken at Washington to put into effect the recommendations in the second traffic report by John A. Beeler presented to the Public Utilities Commission on Feb. 7 and abstracted in the *ELECTRIC RAILWAY JOURNAL* for Feb. 16.

Raised platforms at stopping places of the Capital Traction Company's cars on New York Avenue near Fifteenth Street and on Pennsylvania Avenue near Fifteenth Street were in use successfully by Feb. 19, and it is expected that more will be installed soon along Pennsylvania Avenue between the Peace Monument and the Treasury. Service through the throat of the Capital Traction system already has improved since the first Beeler recommendations went into effect.

The Capital Traction Company is reported to have agreed to all of the skip-stops proposed in the second report, and the details were to be settled on Feb. 20 at a joint conference of the commission and the railway.

The change in operation at the throat was first tried out Sunday, Feb. 17, but the real test did not come until the following day. During non-rush hours cars moved over Fifteenth Street at 10 m.p.h., an improvement of about 3 m.p.h. During the rush-hour cars were loaded rapidly and sent away in pairs without the congestion that occurred when the cars stopped on Fifteenth Street just south of the Pennsylvania and New York Avenues junction.

Jurisdiction Argued

This Question Before Pennsylvania Commission in Cases Involving Six-Cent Fares

Representatives of municipalities and electric railways attended a hearing before the Public Service Commission of Pennsylvania at Harrisburg on Feb. 19 to hear arguments on the question of whether or not the commission has jurisdiction in connection with the applications of electric railways asking for 6-cent instead of 5-cent fares in cities and boroughs that granted franchise rights with the understanding that the fares were not to exceed 5 cents. While there were thirty-three complaints bearing on this question of municipal rights, the argument centered about the situation in Pittsburgh and adjoining boroughs.

CONTENDS BOARD IS WITHOUT JURISDICTION

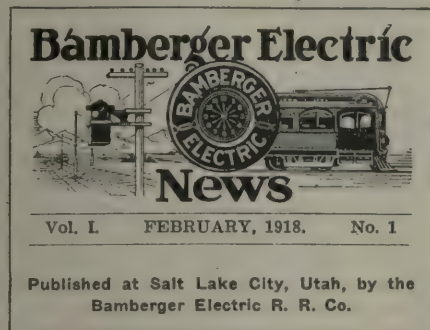
M. W. Acheson, Jr., Pittsburgh, who, with David L. Starr and Lee C. Beatty, solicitor of Allegheny County, represented the boroughs of Allegheny, was the principal speaker for them. He asserted that the commission had no jurisdiction, contending that the Constitution gave to municipalities the right to regulate rates of fares in granting franchises. He said that this right was vested neither in the Legislature nor the courts. Mr. Acheson said the Legislature, by the creation of a commission, could not abrogate that right and, if the right was conceded, the railways did not have authority to raise fares and violate the agreement they had made with a municipality. He argued that if such action was taken the violation of the municipal rights was a matter for the courts to decide.

CASE FOR THE COMPANIES

John C. Bane, representing the Pittsburgh Railways, spoke on the validity of the company's application for the right to increase fares in the Pittsburgh district to 6 cents. He argued two points in particular: Has the commission the right to approve the application and would the approval of the rates as asked be violation of the State Constitution? He said the contention of the complainants that the commission did not have the right to increase fares where municipal franchise agreements interpose was not founded in the law or Constitution and that such granting of a reasonable increase would not violate the Constitution. Asserting that the municipalities and companies have the right to make an agreement regarding rates, he said that conditions could so change that these rates would have to be changed to be reasonable and adequate. It was Mr. Bane's opinion that the commission had the right to fix reasonable and adequate rates, and that this meant not only that it could reduce rates, when they are found to be exorbitant, but that it could increase rates when it is found that rates in effect were so burdensome because of their lowness as to work a material hardship.

Another Company Publication

The Bamberger Electric Railroad, Salt Lake City, Utah, has established *Bamberger Electric News* to keep its patrons more closely in touch with the details of operation of the railroad, to call attention to changes of time-table, reduced rates and special service, and to help to spread the doctrine of safety. The company has asked the co-operation



MASTHEAD OF NEW PAPER

of its patrons and has requested them not to be too hasty in making complaints, though it says that constructive criticism is welcome at all times. The first issue of the new paper contains four pages. It is $3\frac{1}{4}$ in. wide by 9 in. high. The masthead, slightly reduced in size, is shown in the accompanying illustration.

Transportation News Notes

Skip Stop Extended in Syracuse.—Skip-stop operation is now in effect on three full lines of the New York State Railways, Syracuse lines.

Passenger Advance Suspended.—The Public Utilities Commission of Illinois has suspended the proposed advance in passenger rates of the Joliet & Eastern Traction Company. The commission permits the company to file a schedule of fares predicated upon a 2-cent-a-mile basis.

Experimental Jitney Service by Railway.—The Portland Railway, Light & Power Company, Portland, Ore., has re-established its jitney service between Oswego and Oregon City, and will give it another month's trial. If the line does not pay expenses the service will be definitely suspended.

Three Ohio Roads Ask for Increased Rates.—The following roads have asked permission to increase their schedules to a basis of $2\frac{1}{2}$ cents a mile: Dayton, Springfield & Xenia Southern; Mansfield Public Utilities & Service Company, and the Interurban Railway & Terminal Company, to apply on the Cincinnati & Lebanon division.

New Rates on Ohio Electric Become Operative.—The new rate schedule of

the Ohio Electric Railway, Cincinnati, Ohio, formulated on a basis of $2\frac{1}{2}$ cents per mile, went into effect on Feb. 1. Reductions in this rate were made by the Public Utilities Commission on a few short runs near Columbus, but through fares are all to be estimated on the new schedule.

2037 Women Employees in New York.—It was estimated on Feb. 15 that 984 women are working as guards and conductors on the transit lines in New York, 489 on the Brooklyn Rapid Transit cars, 470 on New York Railway lines, and twenty-five for the Hudson & Manhattan Railroad. Including five matrons, 1000 ticket agents and forty-eight car cleaners working for the Brooklyn Rapid Transit Company, New York traction lines employ 2037 women.

Rehearing Denied in Salt Lake Fare Case.—The Public Utility Commission of Utah has denied the petition of E. A. Walton for a rehearing in the case in which the commission recently authorized the Utah Light & Traction Company, Salt Lake City, Utah, to charge a straight 5-cent fare and make other charges in its tariffs. The finding and opinion of the commission in this case were reviewed in the *ELECTRIC RAILWAY JOURNAL* of Feb. 16, page 340.

New Auto Ordinance in Effect.—The jitney ordinance recently passed by the City Commission of Dallas, Tex., imposing restrictions on all automobiles, but aimed particularly at the jitneys, is now being rigidly enforced and as a result the number of jitneys in operation has been reduced by more than one-half. The jitney drivers have filed application for an injunction restraining the city in the enforcement of the ordinance, and the petition has been set for hearing.

New Rate for Ohio Line.—The Dayton, Covington & Piqua Traction Company, West Milton, Ohio, filed a new schedule of rates with the Public Utilities Commission of Ohio, calling for $2\frac{1}{2}$ cents per mile, to take effect on Feb. 19. A hearing was set for Feb. 7. Thomas J. Brennan, general superintendent of the company, met with the commission. After going over the matter thoroughly as to operating expenses and the company's need of more revenue, the new schedule was allowed. It became effective on Feb. 19.

Interurban Seeks Fare Increase.—The Buffalo, Lockport & Rochester Railway, Rochester, N. Y., operating between Rochester and Buffalo and in the city of Rochester, has filed an application with the Public Service Commission for the Second District for permission to increase its rate of fare on commutation books from 1 to $1\frac{1}{2}$ cents a mile on its interurban division, and from 5 to 6 cents within the city of Rochester. It is proposed to have the new schedules go into effect on March 1. No date for a hearing has been set by the commission.

Employment of Women a War Measure.—Richard McCulloch, president of the United Railways, St. Louis, Mo.,

issued a statement recently in which he declared it was not the intention of the company to replace men with women. Mr. McCulloch said the company had been employing every well-qualified man who applied, and had even advanced money for his pressing needs, allowing him to pay back in installments. He said no man had lost his place because of a woman and that none would, but that the employment of women was a war measure.

Fare Action Moving Slowly.—At Frankfort, Ky., the question of raising fares to 6 cents is proving an interesting problem. The Kentucky Traction & Terminal Company has asked the Council to amend its franchise so that a 6-cent fare may be charged. The Council has postponed taking action until the railway files a fuller report on the reason for taking such action. In the meantime the newspapers have been asking for expressions of opinions of the citizens relative to the increase. The Board of Commerce has been keeping out of the matter.

Joint Rates.—The Kansas City, Clay County & St. Joseph Railway (Missouri Short Line) and the Quincy, Omaha & Kansas City Railway (Steam) have adopted joint rates for the benefit of passengers who use both lines. The roads will place extra cars in service from Avondale, on the line of the Kansas City, Clay County & St. Joseph Railway, to Thirteenth and Walnut Streets, Kansas City, in order to relieve the congestion of passengers at the junction of the Kansas City, Clay County & St. Joseph Railway with the Quincy, Omaha & Kansas City Railroad.

Legislation to Help One-Man Cars.—On Feb. 4, 1917, the Board of Aldermen of Salisbury, N. C., passed an ordinance requiring the North Carolina Public Service Company to require all colored passengers to leave the cars by the rear door. This ordinance was carried out until in the fall of 1917 the Public Service Company placed in operation its new light-weight safety cars. With this car it was impossible to live up to the ordinance as passed. As a consequence, representatives of the company, on Feb. 7, 1918, appeared before the board and asked that this ordinance be repealed. This was promptly done.

Women Meet the Test.—Col. Timothy S. Williams, president of the Brooklyn (N. Y.) Rapid Transit Company, in discussing the problems of the company in the current issue of the *B. R. T. Monthly*, had this to say about the employees: "Our men have met this test. They have stood at their duty manfully. They have shown the grit that makes heroes. And our new women! Those who in this great emergency have volunteered to do men's duty! What praise shall we not give to them? Subjecting themselves to a public curiosity from which the feminine nature instinctively shrinks, enduring taunts and insults from society's ruffians, these plucky women have rendered a great public service and are proving their ability to fill a man's job."

Personal Mention

J. W. Lowrie has been appointed traffic manager of the Bamberger Electric Railroad, Salt Lake City, Utah.

W. M. Mills has been appointed auditor of the Glendale & Montrose Railway, Glendale, Cal., to succeed W. S. Easton.

W. L. McKinley has been elected president of the Monterey & Pacific Grove Railway, Monterey, Cal., to succeed Charles N. Black.

J. P. McKinney has been appointed master mechanic of the Durango Railway & Realty Company, Durango, Col., to succeed Thomas D. Wheeler.

E. E. Pateman has resigned as claim agent of the United Traction Company, Albany, N. Y., to enter the military service as a major of infantry.

N. L. Chase has been appointed chief engineer of the power station of the Bridgeport Division of the Connecticut Company to succeed W. H. Goodrich.

Eric Swanson has been appointed chief engineer of the power station of the Danbury & Bethel Street Railway, Danbury, Conn., to succeed O. J. Richmond.

Norman Macbeth has been appointed secretary, treasurer and general manager of the Glendale & Montrose Railway, Glendale, Cal., to succeed W. J. Bohon.

H. W. Fuller, of H. M. Bylesby & Company, Chicago, Ill., has been appointed vice-president in charge of operations of the Northern States Power Company, with headquarters at Minneapolis.

S. G. Shaw has been made supervisor of safety of the Denver (Col.) Tramway to succeed W. C. Swisher, resigned. Mr. Shaw has been connected with the legal department of the company for several years.

Charles B. Hill, Buffalo, has been nominated by Governor Whitman for appointment to the Public Service Commission of the Second District of New York to succeed Chairman Seymour Van Santvoord, resigned.

C. B. Hudson, formerly superintendent of the power plant of the Ithaca (N. Y.) Traction Corporation, has become connected with the Strathmore Paper Company in charge of its power plant at Woronoco, Mass.

George Merriam, heretofore supervisor of service of the Chicago, North Shore & Milwaukee Railroad, Highland, Ill., has been appointed superintendent of the Waukegan North Chicago division of that road.

W. R. Lyon, secretary and auditor of the Los Angeles & San Diego Beach Railway, San Diego, Cal., has also been appointed vice-president, purchasing agent and chief engineer of the company to succeed W. J. Gough.

A. M. Linn, one of the officers of the American Water Works Company, the holding company controlling the West Penn Power Company, Pittsburgh, Pa., has been elected president of the latter companies to succeed Samuel Insull, Chicago, resigned.

W. J. Parker, formerly purchasing agent of the Fort Smith Light & Traction Company, Fort Smith, Ark., is now connected with the City National Bank, Fort Smith, as assistant cashier. Mr. Parker was in the employ of the local railway and light company for eighteen years.

Alfred C. Jordan, for two years commercial manager for the Cumberland County Power & Light Company, Portland, Me., has been appointed superintendent of its electric railway, succeeding G. Sabin Brush, resigned. Mr. Jordan was born in Casco, Maine, thirty-nine years ago. He attended the Deering schools and was graduated from



A. C. JORDAN

Deering High. He then attended the University of Maine, from which he was graduated in 1904. Mr. Jordan then entered the service of the Westinghouse Company at Pittsburgh, Pa., with which company he remained seven years. He next became connected with the Elmira Water, Light & Railroad Company, Elmira, N. Y. Mr. Jordan entered the service of the Cumberland County Power & Light Company, Portland, in 1915, on the power end of the commercial department, and in March, 1917, took up the duties of commercial manager, succeeding George T. Fisher, resigned.

Harley L. Swift, assistant engineer of the Mahoning & Shenango Railway & Light Company, Youngstown, Ohio, has been commissioned first lieutenant in the Sixteenth Regiment of Engineers (Railway) United States Army. Mr. Swift has been in France since August, constructing railroads, warehouses, hospitals, shops, etc.

A. Swartz, as assistant manager of the railway department of the Toledo Railways & Light Company, the Toledo, Ottawa Beach & Northern Railways & Light Company and the Maumee Valley Railways & Light Company, Toledo, Ohio, has been charged with direct supervision over operation, instruction and schedules. This will be in addition to Mr. Swartz's present work as vice-president of the Toledo & Western Railroad.

Harry L. Brown, formerly western editorial representative of the ELECTRIC RAILWAY JOURNAL, with headquarters at Chicago, who recently accepted a temporary appointment as radio engineer in the office of the Chief Signal Officer, United States Army, Radio Division, Washington, has been commissioned a first lieutenant in the aviation section of the Signal Reserve Corps and has been assigned to duty in the training section of the land division, office of the chief signal officer.

V. F. Fabian, for nearly three years superintendent of transportation of the Springfield (Mass.) Street Railway, has resigned. Mr. Fabian has been in the employ of the Springfield system for about eight years. He was superintendent of the Westfield division of the company from 1912 to 1915. Before that he was engaged in office, traffic and power plant work with the New England Investment & Security Company's interests and earlier was engaged in steam railroad service in the West. Mr. Fabian's resignation takes effect on March 1. He has not yet announced his future plans.

G. Sabin Brush, superintendent of the railway department of the Cumberland County Power & Light Company, Portland, Me., since 1915, has been appointed superintendent of transportation of the Springfield (Mass.) Street Railway, succeeding V. F. Fabian, resigned. Mr. Brush's previous experience, following an engineering course at the Massachusetts Institute of Technology, includes varied service in the transportation departments of the Middlesex & Boston Street Railway and the Boston Elevated Railway. At Portland he has had direct charge of the operation of about 107 miles of city and suburban trackage and also has been instrumental in the development of rebuilt and new rolling stock, installation of signals and other equipment which have put the service of the property on a very high plane. Mr. Brush has been actively identified with the Cumberland County company section of the American Electric Railway Association and is one of the best regarded of the younger operating executives in New England electric railway circles. A biographical sketch and a portrait of Mr. Brush were published in the ELECTRIC RAILWAY JOURNAL of Dec. 11, 1915, page 1193.

P. T. Phillips, who has been superintendent of distribution of the Little Rock Railway & Electric Company, Little Rock, Ark., has been appointed general superintendent of both the electric and heat departments and will have

full authority over power-house operation. This appointment is incidental to the merging of the heating business with the other departments in the course of which Commercial Manager Smith takes over the commercial affairs of the heating department, and W. J. Tharp, secretary and auditor, will handle the auditing and statistical records of the company.

W. C. Austin, auditor of the Eastern Pennsylvania Railways, Pottsville, Pa., has been elected assistant secretary and assistant treasurer of that company. In 1917 Mr. Austin was transferred from the staff of traveling auditors of the J. G. White Management Corporation, New York, N. Y., to the accounting department of the Eastern Pennsylvania Railways, which is being operated by the management corporation. For a number of years Mr. Austin was treasurer and auditor of the Otsego & Herkimer Railroad, now the Southern New York Power & Railway Corporation, Cooperstown, N. Y.

L. A. Pettit, Jr., who has been associated with the Albert Emanuel Company, Dayton, Ohio, for the last nine years as general manager of this property and also as an officer of the companies controlled by it, including the Kansas Electric Utilities Company, has severed active connection with the company to engage in the business of controlling and managing public utility properties. Mr. Pettit will remain a director in companies operated by the Albert Emanuel Company. Mr. Pettit also intends to engage in consulting engineering work on utility rates, developments, reports, etc.

William F. Bellmer, who was connected with the Eastern Wisconsin Railway & Light Company at Fond du Lac, Wis., and its successor, the Eastern Wisconsin Electric Company, for eighteen years, has become assistant general manager of the Evanston (Ill.) Railway. Mr. Bellmer was reared on a farm in the town of Friendship, Fond du Lac County, Wis. In June, 1900, he entered the employ of the Fond du Lac Street Railway & Light Company, a successor of the present company in that city, as a trainman, and served in that capacity and as lineman helper, repair man, dispatcher on interurban and city lines, and at the time of his resignation to go with the Evanston Railway he had charge of the roadway and track, the repair shops and the trainmen.

Arthur A. Ballantine of the law firm of Goodwin, Proctor & Ballantine, Boston, Mass., and for many years prominent in electric railway rate and arbitration cases in Massachusetts, has been nominated solicitor of internal revenue by President Wilson. Mr. Ballantine has been serving upon the legal advisory board of the Treasury Department and will continue this work. Mr. Ballantine is thirty-four years of age. He was educated at Harvard College and at the Harvard Law School. He has been closely identified with the movement for increased fares on the Middlesex & Boston Street Railway from the begin-

ning of this work, and has represented electric railway interests in a number of wages arbitration proceedings. In his new service he will make his headquarters in Washington.

H. S. Newton, whose appointment as manager of railways of the Monongahela Valley Traction Company, Fairmont, W. Va., was noted briefly in the *ELECTRIC RAILWAY JOURNAL* for Feb. 16, has been general manager of the Ohio Valley Electric Railway, Huntington, W. Va., since March, 1915. Previous to that he was general manager of the Mesaba Railway, Virginia, Minn., and before that was general manager of the Hartford & Springfield Street Railway, Warehouse Point, Conn., for nine years. Mr. Newton was graduated from the Ohio State University as an electrical engineer. His first commercial work was with the General Electric Company in its Lynn shops. Later he was transferred to the Thomson-Houston Company at Cincinnati and supervised the installation of apparatus on properties throughout the Central West. Mr. Newton next became electrical engineer for the Wheeling (W. Va.) Railway. He left Wheeling to accept the position of electrical engineer for the Syracuse (N. Y.) Street Rail-



H. S. NEWTON

way. He afterward assumed the same duties for the Syracuse Consolidated Street Railway, and finally was employed in the same capacity with the consolidated company, the Syracuse Rapid Transit Railway. He remained at Syracuse six years and combined for a part of the time the office of superintendent of transportation with his engineering duties. Mr. Newton was appointed general manager and chief engineer of the Syracuse, Lakeside & Baldwinsville Railroad when the road was projected, and remained with the company in the capacities named during its construction and for the first two years of its operation. Mr. Newton next became general manager of the Beaver Valley Traction Company, which consolidated four small roads near Pittsburgh. After leaving the Beaver Valley Traction Company Mr. Newton was placed in charge of the Hartford & Springfield Street Rail-

Obituary

W. F. Dillon, president of the Shreveport (La.) Traction Company, is dead. His body was recovered from Caddo Lake near Shreveport on Feb. 8. Mr. Dillon left Shreveport on Jan. 10 for a hunt on Caddo Lake. When he failed to return it was thought that he had been drowned in the lake and persistent search was finally rewarded by the finding of his body. The supposition is that Mr. Dillon was caught in a blizzard in a light boat and drowned when the boat was overturned.

Henry H. Hodel, president of the Cleveland Galvanizing Works Company and the Van Dorn & Dutton Company and a director of the Van Dorn Electric Tool Company and the Equity Savings & Loan Company, Cleveland, Ohio, is dead. Mr. Hodel was born sixty-eight years ago in Alsace-Lorraine, France. He became a pattern maker and in the early eighties went into the custom galvanizing business for himself. He was one of the pioneers in the weldless wire chain business, and helped to found the Van Dorn & Dutton Company and the Van Dorn Electric Tool Company, Cleveland, Ohio.

Porter Norton, a director of the International Railway, Buffalo, N. Y., and a member of the law firm of Norton, Penney, Nye & Brown, counsel for the company, died on Feb. 2. Mr. Norton was sixty-five years old. Soon after being admitted to the bar in 1875 he became associated with Henry W. Box, attorney for the Buffalo Street Railway. He married the daughter of the late S. V. R. Watson, founder of the horse railway in Buffalo, which has developed into the International Railway. Mr. Norton was also a director of the Crosstown Street Railway, now a part of the International Railway, and was a director of the Frontier Electric Railway, under construction, between Buffalo and Niagara Falls.

Augustine W. Wright died on Feb. 3 in Los Angeles, Cal., at the age of seventy-one. Mr. Wright was consulting engineer in connection with the building of the first city railroad in New York and in the early seventies he helped to design the cable railway established in Chicago by the late Charles T. Yerkes, and was chief engineer for this system for a number of years. In 1889 and 1890 he helped to build the first cable railway in Los Angeles. In his early twenties Mr. Wright had charge of much of the construction of the Union Pacific Railway across the plains of Kansas, Nebraska and Colorado. Later he was for five years chief engineer of the Northern Pacific Railway. Mr. Wright retired from active railroad work in 1890 and went to California. At the time of his death he was a member of the Los Angeles Board of Public Utilities.

Construction News

Construction News Notes are classified under each heading alphabetically by States. An asterisk (*) indicates a project not previously reported.

Recent Incorporations

Alabama Interurban Corporation, Birmingham, Ala.—The Alabama Interurban Corporation, which was previously reported as having been incorporated, has been incorporated under the laws of Delaware to build its proposed line from Birmingham to the Warrior River. It is planned to construct only 17 miles of line, entrance to Birmingham to be over an existing road. Capital stock, \$5,000,000, half common and half preferred. Incorporators: Thomas L. Cannon, president; Job Going, H. M. Cassman, Roy McCullough and O. P. Board, all of Birmingham, and James Tracy Hill, New York. [Dec. 8, '17.]

Lewisburg & Ronceverte Electric Railway, Lewisburg, W. Va.—Incorporated to operate the electric railway line between Lewisburg and Ronceverte. Capital stock, \$50,000. Incorporators: J. J. Echols, J. W. Dwyer, J. B. Laing, H. B. Laing, H. B. Moore, E. L. Bell, H. F. Hunter, R. M. Bell and S. P. Preston, all of Lewisburg.

Franchises

Marion, Ohio.—The Columbus, Delaware & Marion Electric Company, the successor to the Columbus, Delaware & Marion Railway, has asked the City Council for a twenty-five year franchise in Marion.

Track and Roadway

Birmingham Railway, Light & Power Company, Birmingham, Ala.—A new line will be built by the Birmingham Railway, Light & Power Company linking the South Bessemer line at Vinesville with the Tidewater and South Ensley lines at Fairfield.

Little Rock Railway & Electric Company, Little Rock, Ark.—Work will be begun at once by the Little Rock Railway & Electric Company on the double-tracking of its Pulaski Heights line and the extension of the line to St. Mary's Convent. The company will also extend its East Ninth Street line from Ninth Street north on Thomas Street to Sixth Street, and thence east to the Weil packing plant.

***Okanagan Lake, B. C.**—It is reported that an electric railway will be

built from Okanagan Lake to Oroville in connection with the development of the West Kootenay Power & Light Company in the Copper Mountain district.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway has acquired all rights-of-way and has asked the Railway Commission of California for permission to extend its line from Glendora to San Dimas, about 9 miles.

Municipal Railway, San Francisco, Cal.—Construction of outer tracks for the Municipal Railway on Market Street from Van Ness Avenue to Third Street will soon be under way. The contract was awarded on Feb. 6 to the Western Construction Company for \$130,808, with a bonus of \$7,000 for completion within 120 days. The contractors signed an agreement not to make a claim for breach of contract against the city within that period should the work be delayed by the non-arrival of special track work from Eastern mills. When this work is completed the Municipal Railway will have a line the entire length of Market Street extending from beyond the Twin Peaks Tunnel to the ferry.

City & Suburban Railway, Brunswick, Ga.—It is reported that the City & Suburban Railway will begin immediately the construction of an extension to several industrial plants.

Macon Railway & Light Company, Macon, Ga.—This company will extend the tracks of its Bellevue car line, now terminating at Broadway and Cherry Streets, to the terminal station as soon as the weather permits.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.—Street cars are now operating on the Tannery Spur, Waukegan, Ill. The cars are able to run from the corner of Washington and Genesee Streets to the hospital, thence north on North Avenue, thence east on Glen Flora Avenue to Sheridan Road. For the present the tracks will not be extended east of Sheridan Road, at least not until the work of opening up Glen Flora Avenue extension has been completed.

Evansville, Suburban & Newburgh Railway, Evansville, Ind.—Members of the United Mine Workers of America in southwestern Indiana coal fields have petitioned the Public Service Commission of Indiana to supply adequate service between Evansville and Boonville.

Hutchinson (Kan.) Interurban Railway.—This company reports that it will build $\frac{3}{4}$ mile of new track this year.

***Middlesboro, Ky.**—The business men and coal operators of Middlesboro have taken up plans for operating an electric railway, it being planned to extend the lines to the principal mines in order

to carry the hundreds of workmen who are now employed in the mines, which are busy the year around. A mass meeting of business men and mine operators was held on Feb. 11, and the following committee was appointed to devise ways and means: J. M. Rogan, chairman; E. S. Helburn, William Walbrecht, E. G. Sheaffer and others.

Washington, Baltimore & Annapolis Electric Railroad, Baltimore, Md.—Plans have been prepared by this company for an extension of its terminals on Pratt Street, Baltimore.

Boston, Mass.—The Boston Transit Commission has recommended in a letter to the Legislature that a downtown subway loop be constructed, with stations on its circumference, to relieve the present congestion of traffic. It advises this instead of a single terminus to the Boylston Street subway as contemplated by the act of 1911, or a double or forked terminal, as it recommended in its report in May, 1914. While it does not propose a route, it offers as an illustration the extension of the Boylston Street subway through Boylston and Essex Streets to the vicinity of the South Station, there passing under or over the Dorchester tunnel; under Federal Street to Post Office Square; under Water and School Streets to Tremont Street, and then under the present Tremont Street subway to Boylston Street.

Boston (Mass.) Elevated Railway.—Tracks for the extension of the Boston Elevated Railway from Summer Street Extension to the South Boston Fish Pier and the 200-ft. freight shed for use by electric freight and express cars of the Boston & Worcester Street Railway and the Bay State Street Railway, have been completed, and it was expected that cars would be operated on the new line by Feb. 16. The line was built by the state and will be leased to the Boston Elevated Railway for operation.

Butte (Mont.) Electric Railway.—Plans are being considered by the Butte Electric Railway for the construction of double-track on Main Street from Galena to Quartz Street and a single track east on Quartz Street to intersect with the present Centerville line.

Public Service Railway, Newark, N. J.—Operation has been suspended by the Public Service Railway on its line from the Lackawanna Station to Hamburg Place and Gotthardt Street owing to the lack of patronage.

Union Railway, New York, N. Y.—Application has been made to the Bronx Borough authorities and the Department of Parks of New York City by the Union Railway, controlled by the Third Avenue Railway, for permission to extend the track facilities at Van Cortlandt Park and 242d Street. Plans have been made, awaiting the sanction of the authorities, by which it is hoped to relieve the great congestion at the subway. The company has in view the lengthening of the siding at the Van Cortlandt terminus by means of a

double cross-over to the Spuyten-Duyvil Parkway as well as the erection of a shelter over the siding at the foot of the subway.

Mahoning & Shenango Railway & Light Company, Youngstown, Ohio.—It is reported that the construction of an extension on Atlantic Avenue and North Liberty Street, Newcastle, is being contemplated by the Mahoning & Shenango Railway & Light Company.

***Tulsa, Okla.**—It is reported that plans will be prepared this year by the Chamber of Commerce of Tulsa for the construction of a line from Tulsa north-eastward to Oologah, about 25 miles. Clarence B. Douglas, secretary.

Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont.—It is reported that it is proposed to utilize hydroelectric power on the Chatham-Wallaceburg section of the Chatham, Wallaceburg & Lake Erie Railway. Owing to coal shortage the company has been unable to generate sufficient power at its own plant to keep the line going.

Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.—It is reported that the City Council of Windsor plans to construct a crosstown line on Erie Street, Windsor, and will rent it to the Windsor, Essex & Lake Shore Rapid Railway for operation.

Ottawa (Ont.) Electric Railway.—A special committee of the Ottawa City Council will take up with officers of the Ottawa Electric Railway the question of an extension of the company's line to Ottawa East.

Dallas (Tex.) Railway.—The first step toward the expenditure of \$1,000,000 for improvements by the Dallas Railway began on Feb. 10 with the work of double-tracking the Columbia Avenue line from Collett to Beacon Street. Rails for this work arrived some time ago. Richard Meriwether, general superintendent, said the work would cost about \$76,000. Other improvements outlined by the company in its statement recently approved by the supervisor of public utilities and by the City Commission will be carried out as rapidly as possible, Mr. Meriwether said. The company is also improving the Oak Cliff lines. New trolley wire is being strung the entire length of Jefferson Avenue at a cost of \$13,000, and the tracks are being overhauled and new ballasting placed where needed. Other improvements in the traction lines to be carried out as soon as material arrives are the double-tracking of Colonial Avenue from Cooper Street, where the double track now stops, to the city limits, and building of the Second Avenue line from Parry Avenue to the city limits.

Eastern Texas Traction Company, Dallas, Tex.—Fire of undetermined origin destroyed 10,000 ties with an approximate value of \$20,000, the property of the Eastern Texas Traction Company at Garland, Tex. The ties had been cut and were stacked over a space about the size of a city block for seasoning.

Newport News & Hampton Railway, Gas & Electric Company, Hampton, Va.—J. N. Shannahan, general manager of the Newport News & Hampton Railway, Gas & Electric Company, is reported as having stated that its line will be extended north of the city to the point recently purchased as a site for \$1,200,000 worth of homes for shipyard employees only on condition that the government provide the funds to finance the extension.

Seattle (Wash.) Municipal Railway.—The extension of the Seattle Municipal Railway into Ballard was opened on Jan. 27.

Tacoma (Wash.) Municipal Railway.—An ordinance has been introduced in the City Council authorizing \$25,000 to be transferred to the light and water reserve fund to pay for the double-tracking of certain places on the municipal car line. C. D. Atkins, head of the public works department, asked that the plans for the improvement of the car lines be approved by the City Council before the final passage of the ordinance.

Monongahela Valley Traction Company, Fairmont, W. Va.—The board of directors of the Monongahela Valley Traction Company has approved the issue of \$3,000,000 of one-year notes, the proceeds to be used for improvements, including a considerable amount of new construction work.

Shops and Buildings

Kansas City, Mo.—A certified check for \$10,000 has been filed with Eugene E. Blake, city comptroller, by the Interurban Central Station Company as evidence of good faith that the new interurban station will be built. The company has until March 8 to file a bond of \$50,000 to be approved by the city comptroller, when it can withdraw its check. The new station will be built on McGee Street, between Ninth and Tenth Streets.

Toronto & York Radial Railway, Toronto, Ont.—The Metropolitan division carhouse of the Toronto & York Radial Railway, together with six interurban cars, was destroyed by fire on Feb. 5.

Philadelphia, Pa.—Bids were opened on Feb. 14 by the Department of City Transit of Philadelphia for contract No. 541 covering plumbing installations in station buildings at Torresdale Avenue and Tioga Street and contract No. 542, covering electric installations in the same buildings. The low bidder for contract No. 541 was Walters, Purks & Mellon, Philadelphia, at \$4,508, and for contract No. 542, Keller-Pike Company, Philadelphia, at \$4,220.

Charleston-Dunbar Traction Company, Charleston, W. Va.—Plans are being made by the Charleston-Dunbar Traction Company to construct a terminal station on Kanawha Street, Charleston.

Power Houses and Substations

Tri-City Railway & Light Company, Davenport, Ia.—Announcement has been made by this company that a new feeder cable of 750,000 circ. mils capacity is being installed in Davenport to meet new requirements of the downtown circuit.

Ottumwa Railway & Light Company, Ottumwa, Ia.—A new 1250-kw. turbine has been completed and placed in operation by the Ottumwa Railway & Light Company. Included with this improvement is a new intake from the river, settling tanks, condensing equipment, boiler feed pumps, water softener and service pumps. The enlargement of the company's station capacity was necessary to supply energy for the increasing business of the company, including Fairfield and other communities in that vicinity.

Cincinnati (Ohio) Traction Company.—Walter A. Draper, vice-president of the Cincinnati Traction Company, has informed Mayor Galvin of Cincinnati that the extension of the North Norwood track to Kennedy Heights and Pleasant Ridge will necessitate the construction of an additional power house at a cost of \$70,000 or \$75,000. Residents of those places had sent a petition to the City Council asking for the extension. Street Railway Director W. C. Culkins will look into the matter further before a final decision is made.

Lake Shore Electric Railway, Cleveland, Ohio.—The power plant at Ballville recently taken over by the Lake Shore Electric Railway will be enlarged and improved.

Columbus Railway, Power & Light Company, Columbus, Ohio.—Improvements, including the purchase of new cars and electric equipment to be used in its power plant, will be made by the Columbus Railway, Power & Light Company. The cost is estimated at about \$175,000.

Harrisburg (Pa.) Railways.—Plans are being made by the Harrisburg Railways for the immediate installation of three large new transformers in its substation to provide for the utilization of power from its York Haven plant through the plant of the Harrisburg Light & Power Company. It is planned to use the current from the substation for the operation of the Second, Third and Fourth Street traction lines.

Puget Sound Traction, Light & Power Company, Seattle, Wash.—Plans have been completed by the Puget Sound Traction, Light & Power Company for the superstructure of its present coal-pulverizing plant, adjoining the power station on Western Avenue and Seneca Street, to cost about \$75,000.

Monongahela Valley Traction Company, Fairmont, W. Va.—It is reported that the Monongahela Valley Traction Company has under construction a new power plant at Rivesville.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS

FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES • MARKET QUOTATIONS • BUSINESS ANNOUNCEMENTS

Considerations in Government Work

Localities in Which Orders Will Not Be Placed and Effect of Other Government Orders

In the matter of placing contracts for goods for government use, the General Engineering Depot, Washington, D. C., in asking for bids is requiring of bidders, "because of the known shortage of power in certain manufacturing districts and in order to conserve this power for the rapid completion of government contracts already under way," to state on demand the localities from which the materials entering into the manufactured articles are obtained. The purchasing officer in this way reserves the right in making awards to discriminate against those bidders who are dependent for their materials upon the manufacturers in congested districts.

In addition, in order that there may be no congestion in factories and that there may be more equitable distribution of goods, bidders are required to state in writing upon the request of the purchasing officer, after proposals are opened, the total money value of uncompleted orders placed with them by the United States and the allied governments. In addition, bidders must also state at that time the class and number of principal and subsidiary priority orders which may have been issued on their manufactured goods affecting directly or indirectly articles upon which they are bidding.

Larger Sales of Self-Truing Brakeshoes

Manufacturers at Present Suffering from Freight Embargo—Increased Sales Due to Enforced Economies

The sale of self-truing brakeshoes was greater in 1917 than ever before. Prices of metal used in the manufacture thereof kept increasing and some trouble was had in getting deliveries from the foundries, but on the whole it was possible to keep customers pretty well supplied. During the year prices were increased slightly. At present the manufacturers are suffering from the embargoes on freight.

The 1917 increased sales seems to be a direct result of the enforced economies which electric railways have had to practice. In many instances it is known that worn and discarded wheels have been salvaged from the scrap pile and pressed into service. Through the use of wheel-truing brakeshoes this can be done in many instances safely and

economically. Then, too, these brakeshoes are used to advantage, when wheels are scarce, as they do the work while the car is in service, thus helping to reduce the non-earning period of a car to a minimum.

Brill Sales Rise 25 per Cent

War Conditions, However, Reduced Equipment Demand and Also Made Its Manufacture Difficult.

The sales value of the combined output of all the plants of the J. G. Brill Company, Philadelphia, Pa., amounted to \$7,706,099 for the calendar year 1917 as compared to \$6,180,895 in 1916 and \$4,403,116 in 1915. The increase for the last year was \$1,525,204 or almost 25 per cent, this comparing with a gain of \$1,777,779 or 40 per cent in 1916. The record of sales since 1907 follows:

1907.....	\$9,211,825	1913.....	\$9,154,433
1908.....	3,845,173	1914.....	4,903,510
1909.....	4,261,204	1915.....	4,403,116
1910.....	5,960,778	1916.....	6,180,895
1911.....	5,870,907	1917.....	7,706,099
1912.....	7,342,090		

The combined result of operation in 1917 was a profit of \$994,189, after deducting \$494,227 for depreciation and the cost of all maintenance and repairs for the year. From this profit there was set aside as a reserve for all federal taxes the sum of \$90,000, leaving a net profit of \$904,189. After further reserving \$100,000 for extraordinary depreciation of special machinery and equipment which may not be absorbed by future profits, and after paying dividends of \$183,200, the total net surplus as of Dec. 31, 1917, amounted to \$1,744,546.

At the beginning of the year, the report states, the management hoped for a continuation of the then existing demand for electric railway equipment. The war conditions of 1917, however, greatly reduced the demand for such equipment and also rendered the manufacture, except from materials on hand, extremely difficult. This was largely due to the inability to obtain raw materials or their transportation for other than government work.

The materials, raw and in process, showed the following totals at the close of recent years: 1914, \$1,516,787; 1915, \$1,739,319; 1916, \$2,242,563; 1917, \$4,234,705. The combined work on hand as of Feb. 6, 1918, amounted to an estimated total in excess of \$20,000,000 including the order for aeroplanes, in which the company is jointly interested with J. G. White & Company, Inc. These two companies organized the Springfield Aircraft Corporation for the manufacture of aeroplanes at the Wasson plant of the Brill company.

Railway Traffic Increased by Shipbuilding Activity

Sudden Demand for Rolling Stock and Slower Deliveries Feature Pacific Coast Trade Conditions

Shipbuilding activity, which has been a factor in transportation problems in all Pacific Coast cities, has increased suddenly and extensively in the northwest since the new year, and new traffic problems are being faced. Portland and Puget Sound have been affected by the increase of shipbuilding activity much more than other points along the coast, but in these cities the problem of handling large rush-hour crowds has become serious. In Tacoma, Seattle, Everett and Bellingham one-man cars have been put in service as rapidly as received in order that equipment of larger capacity could be released for handling shipbuilding crews. Moreover, cars that had been retired from active service have been brought out and repaired for the emergency demands and second-hand cars have been bought wherever this was feasible. Incidentally, the price of second-hand rolling stock has been very materially increased by this demand. The increased activity at the shipyards has come without warning, and there has been no opportunity for the company to secure new equipment under present delayed delivery conditions, even if financial conditions were such as to permit of such a solution.

It is notable that the increase to a 6-cent fare in Portland has caused no confusion or decrease in traffic. The Portland traction company has also pressed old rolling stock into service in order to accommodate the recent traffic increases. Not a little adverse comment has been occasioned by the failure to complete the four-mile stretch of track which would give the cantonment at American Lake electric railway service to Tacoma and Seattle. This cantonment, the largest yet built by the government, and which was planned for 48,000 troops, is still being served only by steam lines and automobile buses. The latter convey practically all of the local traffic and it is necessary to stand in line and sometimes wait long periods before securing accommodation, particularly since the ban on Seattle has been lifted so that large numbers of troops regularly visit that city.

A new angle of the situation on the coast is the question of securing federal aid in financing the need for additional rolling stock to take care of war industries. In the case of the steam roads the government has materially relieved conditions by loaning or inter-

changing equipment where necessary, and it is believed that even though this may not be feasible in just the same way in the case of electric railways, yet the local service which they are rendering is equally important in its way and must not be curtailed. It is suggested that if some plan can be worked out whereby the government will lend its support financially in the securing of such equipment as is urgently needed for emergency traffic requirements, not only would the railways be able to give service that would otherwise be impossible but priority orders could probably be secured to facilitate the prompt delivery of needed equipment.

Deliveries on electric railway supplies and equipment may be said to be worse than they have ever before been on the Pacific Coast. Not only is the delay in transit unusually long, but it is reported that since the government has taken over the direction of transcontinental lines it has been very difficult to

secure information about freight shipments while in transit. No satisfactory explanation of why this condition should obtain has been given except that there is no longer the incentive to the accommodation of shippers which formerly existed.

Practically no important changes in prices have occurred in recent weeks, although there is a tendency to increase all along the line. The rolling stock of nearly all companies seems to be taxed to the limit. The limiting factor on the delivery of new cars at present is the delay in securing car bodies, about one year being the best that can be quoted. Motors and, in fact, all other items, are quoted for better delivery.

Deliveries on standardized items, so far as the factory is concerned, are fair; in fact, better than they were some months ago, but on equipment which is not standard the deliveries are probably worse than ever before.

Shop Equipment in Steady Demand

Various Electric, Pneumatic and Machine Tools Advanced in Price—Shipments and Deliveries Uncertain

Evidence is not lacking that electric railway companies are beginning to buy, not only additional rolling stock, but also accessories and supplies for various purposes. As yet transactions reported are not on a large scale, but purchases represent growing activity. Shop equipment is also coming in for attention, although manufacturers of lathes, borers, grinders, tools of all kinds, jacks and other minor articles, state that while business in their line is steady still it is not brisk. As in other departments of traction properties, the greater part of the buying is to replace outworn machinery or to maintain the efficiency of the shops at a fair working average. Extensions are not being indulged in at present, but reports would seem to indicate that when the financial standing of the companies will permit appropriations for this purpose the repair and construction section will be better and more liberally equipped.

PURCHASES COVER NEED FOR MAINTENANCE AND REPLACEMENTS

A manufacturer of electric and pneumatic tools of nearly every type installed in railway shops, which includes drills, grinders, etc., said that sales had been keeping up fairly well, but just now a falling off is noted. Railways were buying only what they were obliged to for maintenance and replacements, he observed. While his plant was working overtime it was filling government and shipyard orders, and traction road requirements were taken care of in the ordinary course of business. The speaker's company had a special department devoted entirely to supplying railway needs, and as soon as a revival of trade comes along it was in a position to meet any demand. Prices had been advanced with the increased cost of material, metals mainly.

The last revision of from 3 to 5 per cent, averaging \$5 on a tool, was made on Jan. 1. Shipments are back about two months. Some lines could be delivered out of stock, when embargoes were lifted and priority permits granted. Orders for air compressors were back a year in delivery. On small orders deliveries were made by express and even parcel post.

BRISK ACTIVITY IN MARKET FOR PORTABLE ELECTRIC TOOLS

On the other hand, another manufacturer declared the demand for portable electric tools is brisk, but the production was seriously handicapped by the Fuel Administrator's order. One concern, which ordinarily produces 5500 tools of both electric and pneumatic types a month, produced last month only about 3200 tools. This large reduction was caused not only by the fact that the production of this particular plant was affected but also by the further fact that it was impossible to secure the necessary castings, because of delays the foundries suffered in getting raw materials, held up by the fuel order. This concern is about 10,000 tools behind on its orders of all kinds.

In lathes and car-wheel borers for railway repair-shops a leading manufacturer said some sales were being made. An advance of 10 per cent was made on the entire line of lathes and machine tools of this producer the first of the year. Since the fall of 1916 prices had been revised on higher levels of from 75 to 100 per cent. While this company was back on orders of from six to nine months, and even on certain large types of machines a year and a half, deliveries were subject to existing transportation restrictions.

Jacks of various kinds are in brisk demand, and in standard sizes shipments can be made promptly from stock. De-

liveries, of course, are uncertain, excepting when packages are sent by parcel post, which was frequently done. Prices have changed with the fluctuations in the metal market, but no further increase was anticipated.

On lanterns of the special type used by railways, a manufacturer said an advance of 25 per cent was made Jan. 1. Being a staple article the demand is steady. Shipments can be made in thirty days if conditions will allow. It is difficult to obtain glass, particularly red and green. Elsewhere it was learned that the demand for lanterns had been so active that jobbers have instructed their salesmen not to accept orders for several numbers. Deliveries from manufacturers are slow and very uncertain. Prices have advanced and are quoted as follows: tubular, \$7.50 per dozen; large size, cold blast, \$11.50 per dozen; tubular dash lantern, \$10.25 per dozen.

There is also a heavy demand for files, with stocks fair and prices unchanged, with jobbers' discounts as follows: Nicholson files, 50-10-10½; New American, 60-7½; Disston, 50-10-5. Black Diamond, 50-10. Other shop tools and accessories, as to prices and deliveries, range along the lines of the standard equipment referred to above.

Another Advance in Price of Window Glass

Factory Production Curtailed a Third—Priority Order Necessary for Shipment

Milder weather has favored manufacturers of window glass in the matter of fuel supply, but the freight embargo prevents both shipping and receiving, excepting under certain conditions. On some schedules an advance of 20 to 25 per cent in price was foreshadowed; but an increase of 15 per cent on car window glass was positively announced as effective Feb. 7. This is now the ruling figure, with orders in no large numbers or great quantities. From the size of the engagements booked glass manufacturers figure that what is now being bought is for breakage principally or for the reshipping of old cars and changes incidental thereto.

With several important orders for new rolling stock, either placed or pending, it is likely the demand for this class and grade of window glass will be more brisk. The factories, which usually go in blast in September or October, this year deferred the "fire" practically to Dec. 8 and later, consequently the production will total only a third of 1917. Manufacturers are not disposed to pile up stock unless the prospective demand is better.

Shipments can be made from factory stock promptly, but it requires a priority order for transportation. This is the newest restriction, under control of the "Domestic Division, Freight Traffic Committee, North Atlantic Ports," lately established in New York as an appendage of the governmental railroad control.

Rolling Stock

Columbus Railway, Power & Light Company, Columbus, Ohio, is reported to be in the market for new cars.

Manila Electric Railroad & Light Corporation, Manila, P. I., will order fifteen new passenger cars at an early date.

Los Angeles (Cal.) Railway has received twenty-four new car motors from the General Electric Company, Schenectady, N. Y. They have been on order seven months.

Harrisburg (Pa.) Railways Company announces it has ordered five new steel cars from the J. G. Brill Company, Philadelphia, Pa., for its suburban lines. The cars will be delivered early in April.

Danbury & Bethel Street Railway, Danbury, Conn., through J. Moss Ives, permanent receiver, has petitioned the court at Bridgeport for permission to buy at least four new cars, the consent of the bondholders having previously been obtained.

Brooklyn (N. Y.) Rapid Transit Company assured the Public Service Commission, First District, last Friday that it will immediately spend more than \$3,000,000 for new cars, of which 100 will be big steel cars for rapid transit lines and fifty will be surface car trailers of the largest practicable seating capacity. The company will also start in at once to convert 100 of its center-entrance surface cars for multiple-unit operation and fifty four-motor cars to serve as leaders for the trailers and the multiple-unit cars will be used in two-car train operation on congested surface lines. The commission has been urging the Brooklyn company to buy new rolling stock for a year or more. The original recommendation was for 250 cars and the foregoing is a compromise arrangement. While the matter was pending the Brooklyn company contested the commission's authority in many public hearings and in the federal and state courts, finally threatening to take its last defeat on appeal to the Supreme Court of the United States. With the above action all court and other proceedings have been voluntarily discontinued.

Trade Notes

Pittsburgh Wood Preserving Company, Pittsburgh, Pa., with the Ohio Wood Preserving Company, the Michigan Wood Preserving Company and the Acme Tie Company, have moved their general offices to the Century Building, Pittsburgh, Pa.

General Electric Company, Harrison, N. J., has commenced the erection of a large new plant on Cross Street for the manufacture of glass bulbs, and the work is progressing favorably. The company is also planning for the erection of an addition and alterations at its plant at 268 North Nineteenth Street, East Orange, and has taken out a building permit for this purpose.

Holden & White, Inc., Chicago, distributors of Miller trolley shoes and Wasson safety bases, have received orders from Col. Bion J. Arnold for complete equipment of the Elgin & Belvidere Electric Railway with Miller trolley shoes for use in connection with the Wasson safety base. An order has also been received from the Salt Lake, Garfield & Western Railway for twelve Wasson bases for use on new cars which are being built on this property.

Charles H. Keeling, after years of experience in the electrical field, has joined the selling forces of the Square D Company of Detroit, Mich., and will travel in the Canadian territory, with headquarters at Toronto. He was formerly connected with the Renfrew Electric Manufacturing Company, Ltd., Renfrew, Canada, being its first sales representative. In 1916 Mr. Keeling was appointed sales and advertising manager of that company.

Hickey & Schneider, Inc., New York, N. Y., manufacturer of transmission-line equipment, heretofore a partnership, is now to be continued as a corporation, capitalized at \$100,000, according to a statement made by Mr. Schneider, president of the concern. P. Kovac, formerly with the New York Edison Company, is sales engineer in charge of the company's sales and service departments. P. S. Houton, an engineer of broad experience, is to handle the design work.

New Advertising Literature

Cutter Co., Philadelphia, Pa.: A calendar with various interesting information and data regarding this company's line of circuit breakers are included in this calendar.

Railway Improvement Company, New York, N. Y.: A valuable transportation booklet entitled "Traffic Surveys and How They Are Made." The booklet explains the methods which have been successfully pursued by the company in analyzing the car operating conditions on electric railways as a preliminary to the most valuable application of the Rico coasting recorder. The method presented is extremely simple and logical, and one that gives results advantageous in many other respects than those relating to the saving of power. Copies of this publication are available on request.

Terry Steam Turbine Company, Hartford Conn.: Interesting applications of steam turbines in naval public utility and industrial service are illustrated in bulletin 242, just distributed by this company. In this twenty-eight-page publication the advantages of turbine drive for auxiliaries are featured, followed by a clear-cut description of the Terry wheel and principle of operation, with diagrammatic explanation of the action of steam, reasons for selecting this product and a condensed engineering discussion of eleven cardinal points in design. A full-page illustration of labeled turbine parts is included, and an interesting diagram is added showing the relative water rates with and without the use of partial nozzle control. The principal engineering features bearing upon turbine selection are set forth in simple terms easily understood by the industrial executive and sufficiently complete in detail to interest the technical reader. Shaft whipping, maintained alignment, handling fractional loads efficiently, low upkeep cost and reliability are a few of the points discussed. Applications of the vertical type of unit used for the past decade on United States destroyers, late advances in turbines giving various classes of pumping service handled by this equipment, are featured.

RAILWAY MATERIALS

	Feb. 13	Feb. 20
Rubber-covered wire base, New York, cents per lb.	30	27-34
Weatherproof wire (100 lb. lots), cents per lb., New York	28¼-34¼	28¼-34¼
Weatherproof wire (100 lb. lots), cents per lb., Chicago	33½-38.35	33½-38.35
Rails, heavy, Bessemer, Pittsburgh	\$55.00	\$55.00
Rails, heavy, O. H. Pittsburgh, per gross ton	\$57.00	\$57.00
Wire nails, Pittsburgh, per 100 lb.	\$3.50	\$3.50
Railroad spikes, 9/16 in., Pittsburgh, per 100 lb.	\$3.90	\$3.90
Steel bars, Pittsburgh, per 100 lb.	\$5.00	\$5.00
Sheet iron, black (24 gage), Pittsburgh, per 100 lb.	\$5.80	\$5.80
Sheet iron, galvanized (24 gage), Pittsburgh, per 100 lb.	\$4.85	\$4.85
Galvanized barbed wire, Pittsburgh, cents per lb.	\$4.35	\$4.35
Galvanized wire, ordinary, Pittsburgh, cents per lb.	\$3.95	\$3.95
Cement (carload lots), New York, per bbl.	\$2.25	\$2.25
Cement (carload lots), Chicago, per bbl.	\$2.31	\$2.31
Cement (carload lots), Seattle, per bbl.	\$2.65	\$2.65
Linseed oil (raw, 5 bbl. lots), New York, per gal.	\$1.31	\$1.33
Linseed oil (boiled, 5 bbl. lots), New York, per gal.	\$1.32	\$1.34
White lead (100 lb. keg), New York, cents per lb.	10	10
Turpentine (bbl. lots), New York, cents per gal.	48½	47½

NEW YORK METAL MARKET PRICES

	Feb. 13	Feb. 20
Copper, ingots, cents per lb.	23½	23½
Copper wire base, cents per lb.	27	27
Lead, cents per lb.	7	7
Nickel, cents per lb.	50	50
Spelter, cents per lb.	8	8
Tin, Straits, cents per lb.	*\$5.00	*\$5.00
Aluminum, 98 to 99 per cent, cents per lb.	34-36	34-36

OLD METAL PRICES—NEW YORK

	Feb. 13	Feb. 20
Heavy copper, cents per lb.	22	22
Light copper, cents per lb.	19½	19½
Red brass, cents per lb.	17½	17½
Yellow brass, cents per lb.	13	13
Lead, heavy, cents per lb.	6	6
Zinc, cents per lb.	5¼	5¼
Steel car axles, Chicago, per net ton	\$42.42	\$42.42
Old carwheels, Chicago, per gross ton	\$30.00	\$30.00
Steel rails (scrap), Chicago, per gross ton	\$35.00	\$35.00
Steel rails (relaying), Chicago, per gross ton	\$60.00	\$60.00
Machine shop turnings, Chicago, per net ton	\$17.00	\$17.00

*Nominal.



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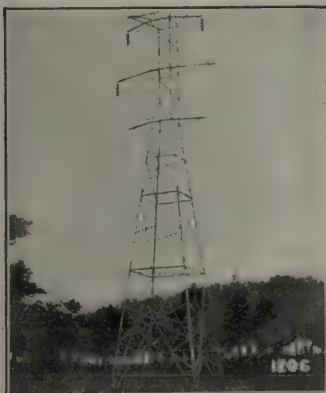
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 Portland, Ore., Selling Building
 Seattle, Wash., 4th Ave. So. Cor. Conn. St.

Export Representative:

United States Steel Products Co., 30 Church St., N. Y.

*Elec Ry. Jrrl.
 Jan. 5, 1917*

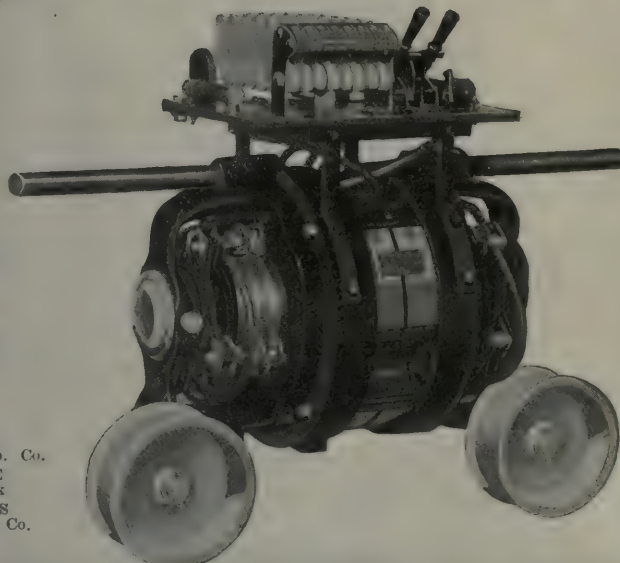
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Table 1—Schedule Speed Efficiency as Affected by Voltage

Stops per Mile	400-Volt Schedule		500-Volt Schedule		600-Volt Schedule	
	M.P.H.	Per Cent	M.P.H.	Per Cent	M.P.H.	Per Cent
30-40	12.4	79	14.2	90.5	15.7	100
	11.0	87	12.2	93.2	13.1	100
	9.9	86.6	10.75	94.3	11.4	100
	9.1	91	9.6	96.0	10.0	100

Calculated on basis of tangent level track and without leeway.

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The second-class rate is a means used by the Government for generations to promote the dissemination of first-class literature among the people.

And the present "adjustment" of second-class rates will simply result in raising the cost to the people of **national** educational literature and the cost of the effective valuable services rendered by publications that serve **national** business and **national** productive activities.

For the purpose of making the matter clear, however, let us admit for a moment that the "subsidy" argument is correct and that publications do enjoy a special profit because of the second-class privilege.

Under that assumption what is to prevent Congress from taking that profit by taxation?

The publishers have petitioned Congress to do that. They have said take all the profits of our business but leave **us the business**.

This petition Congress has denied. Instead it has passed a law in the guise of an adjustment of second-class rates that will put many publishers out of business, will cripple and stultify the service which **national** publications render to readers and subscribers, will impede the progress of business, of science and of production in all lines and will choke the growth of **national** unity of thought, **national** sentiment, and **national** intelligence by checking the growth of a truly **national** and tremendously helpful service which is rendered by a **national** literature.

The publishers have asked Congress to "take the fruit but leave the fruit trees." And Congress has insisted on putting the axe to the trees. **Why?**

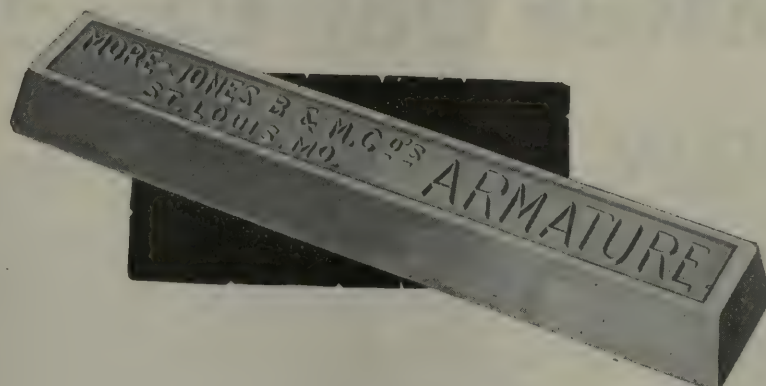
A Real Danger to Commerce. This bill is reactionary. Dangerous to business. Involves serious and far-reaching consequences. It should be repealed.

Urge your Congressman and Senator to repeal this bill. Tell him to take the publishers' profits if necessary, **all** of them, but not to let this unjust and dangerous bill stand.

McGraw-Hill Co., Inc., New York

Publishers of	{ Power	Coal Age	The Contractor	Electric Railway Journal
	{ Electrical World		Electrical Merchandising	Engineering and Mining Journal
	{ American Machinist		Engineering News-Record	Metallurgical and Chemical Engineering

The Babbitt that's better



It stands to reason that a specialty product like More-Jones Armature Babbitt must be superior to ordinary babbitts.

Developed for armature bearing service exclusively. Made only of pure, new metal, perfectly amalgamated and of uniform composition.

MORE-JONES : ARMATURE : BABBITT METAL

is unsurpassed for toughness and ability to withstand high temperatures. It will remelt over and over, maintaining practically the same physical properties unimpaired.

The mileage records made by More-Jones Armature Babbitt Metal prove it the most economical metal you can use. Give us an opportunity to show what it can do for you.

More-Jones Brass & Metal Co.

3134 No. Broadway

St. Louis, U. S. A.

*Further information and
prices on application*

Collier Car Cards Show Diversity

Variety is the spice of life

It is also an important element in the success of car card advertising!

Realizing this, the great staff of artists and advertising writers employed in Collier Service is continually developing many new forms of pictorial and verbal appeal for more than fifty different industries.

Such help in maintaining the revenue—producing value of car card advertising is possible only from a great, highly-specialized organization like that of

Barron G. Collier
INCORPORATED

Candler Building

220 West 42nd Street, New York City



Columbia Electric Welding



BIG gear cases for electric railway use have to bear big stresses.

They cannot be welded any too well to stand the bumps of poor paving.

That's why we use the best electric equipment available.

And why our electric welding man does little else.

Specialization is the road to perfection.

There's a specialist for each and every department of Columbia manufacture.

And that's true of all the items listed below.

Columbia Machine Works & Malleable Iron Co.

TOOLS

Armature and Axle Straighteners
Armature shaft straighteners
Armature buggies and stands
Babbiting molds
Banding and heading machines
Car hoists
Car replacers
Coil taping machines for armature leads
Coil winding machines
Pinion pullers
Pit jacks
Signal or target switches
Tension stands

Atlantic Ave. and Chestnut St.

Brooklyn, N. Y.

W. R. Kerschner Co., Inc., N. Y.
Holden & White, Inc., Chicago
F. F. Bodler, San Francisco
Railway & Power Eng. Corp., Ltd., Toronto, Can.



CAR EQUIPMENT

Armature and Axle Bearings
Armature and field coils
Bearings (Axle and Armature)
Brush-holders and brush-holder springs
Brake, door and other handles
Brake forgings, riggings, etc.
Car trimmings
Commutators
Controller handles
Forgings of all kinds
Gear cases (steel or malleable iron)
Grid resistors
Third-rail shoe beams and accessories
Trolley poles (steel) and wheels

YOU ARE OPEN TO CONVICTION—

Dear Sir:

You are interested in electric railway work. You have certain problems to contend with at all times. You are probably not interested in, and do not resort to, theoretical treatises for explanation of your difficulties—

But you are interested in practical and authoritative construction, operating and maintenance facts — WORKING DATA.

We believe we can convince you that you need Richey's

Electric Railway Handbook

but what we are going to say here or what anyone else says is not to enter into the process of convincing you.

We want to convince you with the book itself—with its over eight hundred pages of the most valuable information about electric railway work of to-day — arranged for daily use.

We want to send you the book now, before you pay one cent.

In order to have the work sent free for inspection you need not even go to the trouble of writing—just fill out the attached coupon and mail to us.

Keep the book ten days—this will be sufficient time in which to convince yourself that it is the most compact, complete and valuable work on the subject ever attempted. You will wonder how it was ever possible to gather together so much material of vital importance to the electric railway man—

Then send the book back—if you think you can afford to be without it.

Yours very truly,

McGraw-Hill Book Co., Inc.

The book contains 832 pages of usable information. Bound in limp red leather. Title and edges in gold. Can be carried in the pocket.



McGraw-Hill Book Co., Inc.,
239 W. 39th St.,
New York, N. Y.

You may send me on 10 days' approval:

Richey—Electric Railway Handbook, \$4.00 net.

I agree to pay for the book or return it postpaid within 10 days of receipt.

.....I am a regular subscriber to the Electric Railway Journal.

.....I am a member of A. I. E. E. or A. E. R. A.

(Signed)

(Address)

Reference

(Not required of subscribers to the Electric Railway Journal or members of A. I. E. E. or A. E. R. A. Books sent on approval to retail customers in the U. S. and Canada only.)

THERE ARE THREE VALUES FOR RAILWAY COMPANIES IN THE SPECIFICATION and USE OF

CYPRESS

“THE WOOD ETERNAL”

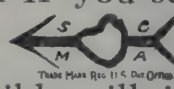
for Crossarms, Car Material, Fencing, Station Construction and similar railway purposes:

First, the vastly longer life of the material itself. *All-Heart Cypress* is pretty nearly *proof* against the action of decay.

Second, the

SAVINGS OF LABOR COSTS IN YOUR MAINTENANCE WORK.

Obviously the longer the serviceable life of the lumber you use, the less you are going to have to repair and replace. That of course means not merely saving in cost of material, but also saving in the much bigger item—*cost of labor*.

Third, when you specify Cypress you can know *definitely* that you get what you pay for IF you see THIS MARK: This mark  is on the ends of every piece of Cypress cut by the responsible mills in this Association. It is a guarantee that the material bearing it is made, *and graded at the mill*, in accordance with the scrupulously high standards demanded by this Association and the best customers of its members.

These *values* are worth *getting*. The *facts* are worth *remembering*.

Our data is at your service.

SOUTHERN CYPRESS MFRS.' ASS'N.

1265 Hibernia Bank Building, New Orleans, La., or
1265 Heard National Bank Building, Jacksonville, Fla.

EFFICIENCY — RELIABILITY — SIMPLICITY

Allis-Chalmers Steam Turbines

District Offices

Atlanta, Ga.
 Boston, Mass.
 Buffalo, N. Y.
 Chicago, Ill.
 Cincinnati, Ohio.
 Cleveland, Ohio.
 Dallas, Texas.
 Denver, Colo.
 Detroit, Mich.
 Duluth, Minn.
 El Paso, Tex.
 Kansas City, Mo.
 London, England.
 Los Angeles, Cal.
 Milwaukee,
 West Allis Works.
 Minneapolis, Minn.
 New Orleans, La.
 New York, N. Y.
 Philadelphia, Pa.
 Pittsburgh, Pa.
 Portland, Ore.
 St. Louis, Mo.
 Salt Lake City, Utah.
 San Francisco, Calif.
 Santiago, Chile
 So. America.
 Seattle, Wash.
 Toledo, Ohio.

Show sustained economy after years of operation
 Units built in sizes from 200 K.W. up



3200 KW., Max. 3600 R.P.M., H. P. Condensing Steam Turbine and Alternator.
 Unit of this size installed in the plant of the Eastern Pennsylvania Ry. Co., Alto, Pa.

Allis-Chalmers Manufacturing Co.

Milwaukee, Wis.

For all Canadian Business refer to Canadian Allis-Chalmers, Ltd., Toronto, Ont., Canada

FMB Grid Resistors

ARE MADE RIGHT AND STAY RIGHT

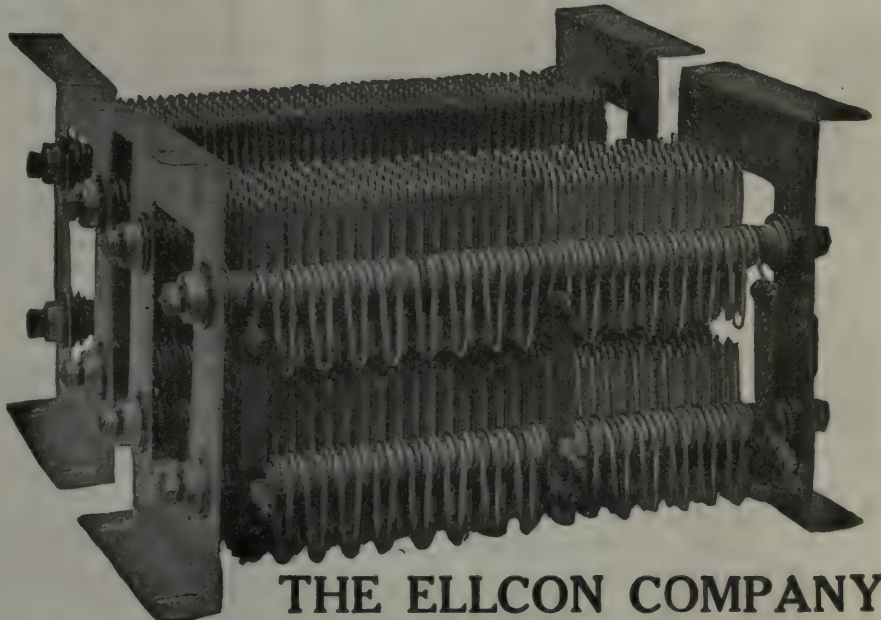
No resistors get more abuse than those under a car.

They are abused electrically by careless operation of the controller.

They are abused mechanically by exposure to dusty, muddy and stone-littered streets.

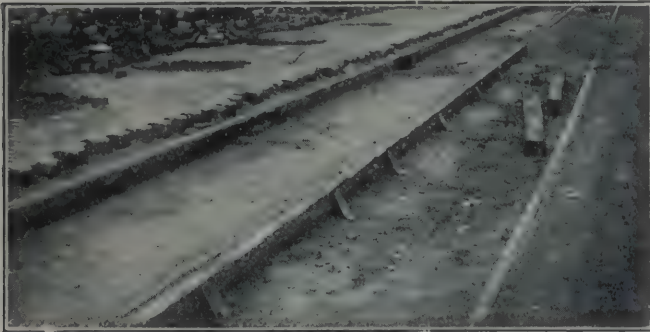
Until the arrival of E M B drawn, non-corroding grid resistors, troubles from these sources seemed unavoidable.

E M B grid resistors actually have made this part of your equipment troubleproof.



THE ELLCON COMPANY

50 Church Street, New York



Waste

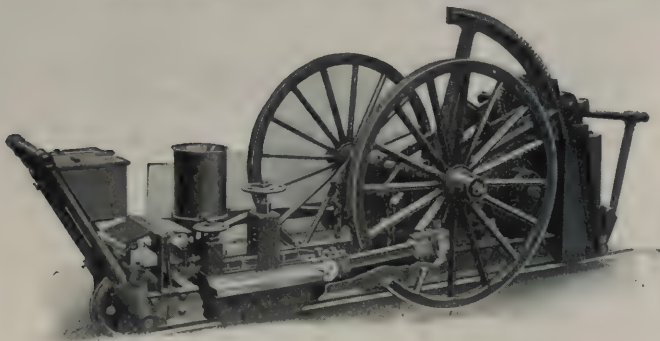
**in peace times is bad business
—in war times it is criminal**

You Can Stop It!

Now, more than ever before it is necessary to conserve your resources — *labor, materials, capital.*

Postpone laying new tracks, prevent rapid deterioration of rolling stock, cut down expenses, and add to the comfort of your passengers, by installing the

RECIPROCATING TRACK GRINDER



Removes destructive bumps, cups, and corrugations at very low cost per mile of track. Get the only genuine evidence of efficiency. Let us ship, and put a machine at work on your tracks, to prove its own case, without risk or expense to you. Wire or write.

RAILWAY TRACK-WORK COMPANY

30th and Walnut Streets
PHILADELPHIA, U. S. A.

Agents
Holden & White, Inc., 343 S. Dearborn St., Chicago.
Wigmore, Hall & Co., Pacific Electric Bldg., Los Angeles, Cal.

The On-Time Advertiser

who gets his copy and cuts to us well before the day his advertisement should go to press, gets better type composition, better location and a better opportunity to make necessary corrections on the proofs, which can then be submitted before publication.

The Last-Hour Advertiser

whose copy and cuts come in at the last minute or even later, gets the best attention we can possibly give him. We work overtime to do what we can for him. But the lack of sufficient time makes it physically impossible to do as well for him as for the advertiser whose instructions come in well before the last hour.

Get Your Copy and Cuts in Early

Do this, not on our account, but for the sake of your own advertising. We want to serve all advertisers equally well—but we can't put more hours into a day, and the advertiser who gives us the most time gets the best results.

Copy and cuts should be in our hands by Tuesday of the week preceding the date of issue. This means that Tuesday is the *last* day on which copy can be handled normally.

After that we cannot promise proofs, and we cannot insure classification.

For good advertising, get your cuts and copy in every week *before* Tuesday.

Electric Railway Journal

10th Ave. at 36th St., New York

The new high speed interurban cars recently placed in service by the Jamestown, Westfield & Northwestern Railroad are fitted with Standard No. 1062 rolled steel wheels mounted on Standard axles.

—Representative practice



STANDARD STEEL WORKS CO.

Morris Building, Philadelphia

New York
Chicago
St. Louis
Pittsburgh
San Francisco
Richmond

Portland
Havana, Cuba
London, Eng.
Melbourne, Aust.
Monterey, Mex.
Mexico City.



Step by Step

good qualities are improved and bad eliminated; that is the way in nature and in industry alike. But progress to be sure-footed must start from a good foundation and must proceed by the use of methods taught by experience.

In the case of high duty gears, for instance, the wooden gear has given place to cast iron, the cast iron to cast steel, and the cast steel, in turn, has been succeeded by the heat treated rolled steel gear which represents the most efficiently practicable type of modern gearing and which includes all the merits of its predecessors but none of their demerits.

The gear cutter has built the modern high duty, long service, heat treated gear on a foundation made for him by the steel maker, and the steel maker, in turn, when he furnished the gear cutter the solid rolled steel blank worked into that blank all the skill which comes from long years of experience.

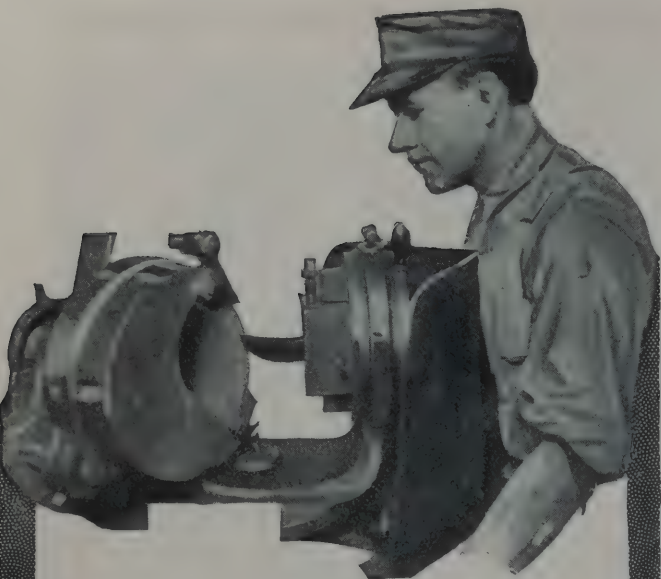
The heat treated solid rolled steel gear cut from a

Carnegie Rolled Gear Blank

is the last word in effective gearing. Users of large size, high duty transmission gearing can well afford to investigate its merits and to profit by the orderly course of its development. It weighs less than any of its predecessors but surpasses them three or four to one in the matter of endurance.

Carnegie Steel Company

General Offices: Pittsburgh, Pa.



Alundum for High Speed Steel Tools

The grinding of high speed steel tools requires the use of a wide variety of wheels, each one the correct wheel for its purpose.

For offhand grinding the wheels range in grade from M to P and in grain from 20 to 80, according to the size of the wheel. The abrasive is exclusively Alundum and the process both Vitrified and Silicate.

For automatic machines, similar to that pictured above the wheels usually supplied are listed below.

Gisholt	
20 M and N	Vitrified Alundum
Sellers No. 1	
20-24 L and M	Vitrified Alundum
20-24 L and M	Silicate Alundum
Sellers No. 2	
36 L	Vitrified Alundum
30 and 36 M	Silicate Alundum
Taylor	
24-0	Silicate Alundum



NORTON COMPANY

WORCESTER, MASS.

NEW YORK STORE
151 Chambers St.

CHICAGO STORE
11 N. Jefferson St.
857a

RIMCO

RUBBER INSULATED PLIERS

The Pliers that
have aroused the
Electrical Field.
Unbreakable, semi-
soft insulation.

Ask for prices.



**Every Pair
Tested**



**The Rubber Insulated Metals
Corporation**

Sole owners of the Elchemco Process for bonding rubber to metals,
protected by American and Foreign Patents

Plainfield, N. J.

SALES AGENTS

Electric Service Sup-
plies Co., 17th and
Cambria Sts., Phila-
delphia.

National Railway
Appliance Co., 50 East
42nd St., New York.

Canadian Distribu-
tors: Lyman Tube &
Supply Co., Montreal,
Toronto, Winnipeg.

FREE



—a handbook on economical connections — and a sample Frankel Solderless Connector.

MAKERS OF THE BEST ONLY

FRANKEL

CONNECTOR CO. INC. N.Y.

Factory:
177-179 Hudson St.,
New York
Sales Rooms:
1140-1146 Broadway


The man on your road responsible for economical and proper electrical connections will appreciate the story that this book and sample connector will tell.

Both represent new ideas — both point the way to better splices.

You incur no obligation in writing for them. Do it now.

STEEL POLES

For Every Pole Purpose



Bates Steel Poles Ornamenting the Approach to the New Wisconsin State Capitol Building, Madison, Wis.

Strongest STEEL POLE of like weight in the world.
Best STEEL POLE in the world for electric railway trolley service, Power Transmission or Street Lighting.
Most artistic STEEL POLE in the world for any service.
We make the lowest prices.
We have constantly on hand about two thousand tons of steel and can make immediate shipments.
A full line of convenient malleable fittings.
Our steel pole *TREATISE* tells a big story. Ask for it.

BATES EXPANDED STEEL TRUSS CO.
208 South La Salle St., Chicago, Ill., U. S. A.

ALUMINUM COMPANY OF AMERICA

PITTSBURGH, PA.

Manufacturers of Aluminum, Ingot, Sheet, Tubing, Wire, Rod, Rivets, Moulding, Extruded Shapes, Electrical Conductors

General Sales Office, 2400 Oliver Building, Pittsburgh Pa.

BRANCH OFFICES

Boston.....	131 State Street
Chicago.....	1500 Westminister Building
Cleveland.....	950 Leader-News Building
Detroit.....	1512 Ford Building
Kansas City.....	308 R. A. Long Building
New York.....	120 Broadway
Philadelphia.....	1216-1218 Widener Building
Rochester.....	1112 Granite Building
San Francisco.....	731 Rialto Building
Washington.....	509 Metropolitan Bank Building

CANADA—Northern Aluminum Co., Ltd., Toronto
LATIN AMERICA—Aluminum Co. of South America, Pittsburgh, Pa.
ENGLAND—Northern Aluminium Co., Ltd., London

Send inquiries regarding aluminum in any form to nearest Branch Office, or to General Sales Office.

AWARDED



American

Rail Bonds

Crown
United States
Twin Terminal
Soldered

American Steel & Wire Company
Chicago New York Cleveland Pittsburgh Worcester Denver

Export Representative: U. S. Steel Products Co., New York
Pacific Coast Representative: U. S. Steel Products Co.
San Francisco Los Angeles Portland Seattle

You Are Never in Doubt

when your road is protected by

Nachod Signals



No matter what your road conditions are, a Nachod will take care of them. There are 7 types of Nachods for all service, from high speed interurban to city travel.

Write for information.

Nachod Spells Safety.

NACHOD SIGNAL CO., Inc.
Louisville, Ky.

PACIFIC COAST REPRESENTATIVES
BOYLES & SMITH CO., Portland, Oregon, San Francisco, Cal.,
Los Angeles, Cal.

2234

THE LINDSLEY BROTHERS CO.

Western "Good Poles Quick" Northern

Quick Shipments
from our
Minneapolis Yard

Rooms 832-834, 72 West Adams St., Chicago, Ill.

Spokane - St. Louis

Butt Treating
Open Tank and
"Hot and Cold" Processes

FEDERAL SIGNAL CO.

ALBANY, N. Y.

CONSULT OUR ENGINEERS ON YOUR
SIGNAL REQUIREMENTS

52 Vanderbilt Avenue, New York Monadnock Block, Chicago
118-130 New Montgomery St., San Francisco, Cal.



The Trenton

Three Section Tower Outfits to fit any make of chassis.

Write for literature and prices.

J. R. McCARDELL & CO., Trenton, N. J.

POLES WESTERN CEDAR PILING

We brag about the SERVICE we give

B. J. CARNEY & CO.

E. B. BRANDE, Manager M. P. FLANNERY, Manager
819 Broad Street, Grinnell, Ia. Spokane, Wash.
WM. MULLER & CO., 1729 McCormick Bldg., Chicago.
Commit us to memory.

Wire Rope
and Wire

Insulated
WIRES and
CABLES



JOHN A. ROEBLING'S SONS COMPANY, Trenton, N. J.

Aristos "COPPERWELD"—Copper Clad Steel Wire—

Beats Solid Copper 40 Ways

Cheaper—Lighter—Stronger—Higher Elastic Limit—Costs Less to Maintain

GET DATA

Made from the product of Copper Clad Steel Co. of Pittsburgh, Pa.
General Sales Office PAGE STEEL & WIRE Western Sales Office
Page Steel & Wire Co. COMPANY Steel Sales Corporation
30 Church St., New York Monessen, Pa. Chicago, Ill.

Chapman

Automatic Signals

Charles N. Wood Co., Boston



Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG.

ARCHBOLD-BRADY CO.

Engineers & Contractors SYRACUSE, N. Y.

Peirce Forged Steel Pins with Sheet Steel Thimbles

Your best insurance against insulator breakage

Hubbard & Company

PITTSBURGH, PA.

EUREKA PRODUCTS

Commutators, Trolley Wheels, Sleet Trolley Wheels,
Trolley Ears, Line Material, Controller Fingers, Brush
Holders, etc

We make quality goods.

THE EUREKA COMPANY, North East, Pa.

AETNA INSULATION LINE MATERIAL

Third Rail Insulators, Trolley Bases, Poles, Harps and Wheels,
Bronze and Malleable Iron Frogs, Crossings, Section Insulators,
Section Switches.

Albert & J. M. Anderson Mfg. Co.

289-93 A Street, Boston, Mass.

Established 1877.

Branches—New York, 135 B'way, Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St.
London, 48 Milton Street.

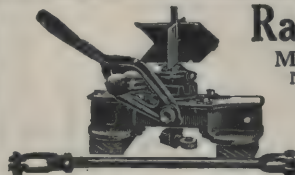


Ramapo Iron Works

Main Office, Hillburn, N. Y.

New York Office: 30 Church St.

Automatic Switch Stands,
T-Rail Special Work,
Manganese Construction,
Crossings, Switches, Etc.



"WHALEBONE"

Fibre Track Insulation

DIAMOND STATE FIBRE CO.

Elsmere, Del.

Bridgeport, Penna.

Chicago, Ill.

Kilby Frog & Switch Co.

BIRMINGHAM, ALA.

Tongue Switches, Mates, Frogs, Curves and
Special Work of all kinds for Street Railways

BARBOUR-STOCKWELL CO.

205 Broadway, Cambridgeport, Mass.

Established 1858

Manufacturers of

Special Work for Street Railways

Frogs, Crossings, Switches and Mates

Turnouts and Cross Connections

Kerwin Portable Crossovers

Balkwill Articulated Cast Manganese Crossings

ESTIMATES PROMPTLY FURNISHED

SPECIAL TRACK WORK

SWITCHES, FROGS AND CROSSINGS.

ANTI-KICKING BIG HEEL

SWITCHES.



TRACK WORK

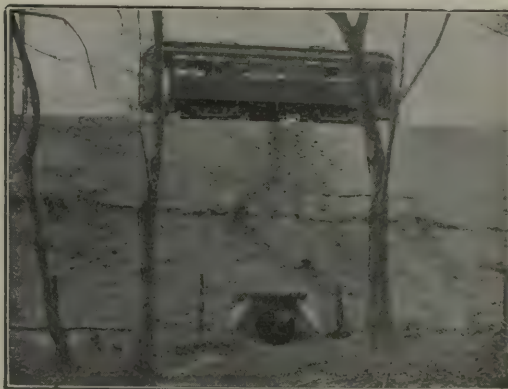
OF EVERY DESCRIPTION.

HARD CENTER CONSTRUCTION.

Balkwill Articulated Cast Manganese Crossings

New York Switch & Crossing Co.

Hoboken, N. J.


"ACME" (NESTABLE)
CORRUGATED CULVERTS
READY FOR SHIPMENT

We always carry a big stock of "ACME" (Nestable) Culvert. Your order for five or ten thousand feet is usually ready for shipment, either Set-up or nested as you prefer, the day it is received.

Ordinary full circle Culverts take four times the car space needed for the nested "ACME" and there's usually a factory delay of from five to ten days.

"ACME" Corrugated, Galvanized Culverts are suited to every culvert service and the Anti-Corrosive NO-CO-RO METAL (99.90% pure iron) guarantees their lasting qualities. Write for Catalog G-3.

THE CANTON CULVERT & SILO CO.
 MANUFACTURERS
 CANTON, OHIO, U.S.A.
The Babcock & Wilcox Company

85 Liberty Street, New York

WATER TUBE STEAM BOILERS

Steam Superheaters

Mechanical Stokers

Works: BARBERTON, OHIO—BAYONNE, N. J.

BRANCH OFFICES:

ATLANTA, Candler Building.
 BOSTON, 49 Federal St.
 CHICAGO, Marquette Building.
 CINCINNATI, Traction Building.
 CLEVELAND, New England Building.
 DENVER, 435 Seventeenth St.

HAVANA, CUBA, Salle de Aguilar 104.
 HOUSTON, TEX., Southern Pacific Bldg.
 LOS ANGELES, I. N. Van Nuys Bldg.
 NEW ORLEANS, 533 Baronne St.
 PHILADELPHIA, North American Building.
 PITTSBURGH, Farmers' Deposit Bank Bldg.

SALT LAKE CITY, 705-6 Kearns Bldg.
 SAN FRANCISCO, Sheldon Bldg.
 SAN JUAN, Porto Rico, Royal Bank Bldg.
 SEATTLE, Mutual Life Building.
 TUCSON, ARIZONA, Santa Rita Hotel Bldg.

TOOLS

for all classes of electrical construction and repair work. Write for catalog.

Mathias Klein & Sons Canal Station 25 **Chicago**The MODERN
WAY of handling
ASHES is by the**GECO****STEAM JET CONVEYOR**

GREEN ENGINEERING CO.

East Chicago, Indiana

Bulletin No. 1 Green Chain Grate Stokers.

Bulletin No. 2 Geco Steam Jet Ash Conveyors.

HIGHEST QUALITY**TRACK SPECIAL WORK****WE MAKE THIS GRADE ONLY****CLEVELAND FROG & CROSSING CO.****CLEVELAND OHIO**

MICA

INDIA
DOMESTIC
OR
AMBER

Cut to Any Size,
Shape or Pattern

Write for samples and prices

A. O. Schoonmaker Co.
88 Park Place
New York

Send for Our New Booklet on the Subject of Water as Used for Steam Making

The subject is one that cannot be dealt with adequately in the limited space of an advertisement.

This booklet explains *the causes of Corrosion, Incrustation, Foaming and other troubles, and offers a scientific solution of these difficulties.* We believe it will make you realize more fully than you do already, how destructive of boilers and boiler efficiency untreated feed waters may be.

We believe a study of the booklet will also convince you that we are capable of dealing with the proposition in the most effective manner, and we hope that you will fill out the card at the back of the booklet and send to us with a gallon sample of your boiler feed supply for our analysis and proposition.

Let us have your address and the booklet will be forwarded at once.

Dearborn Chemical Company

General Offices, 332 South Michigan Ave., Chicago
Laboratory & Factory, 1029-1037 West 35th St., Chicago



We specialize in the
manufacture of

High Grade Motor and Generator Brushes For Railway Equipment

and for all other types of
electrical machinery and are
in position to make prompt
deliveries.

**THE UNITED STATES
GRAPHITE COMPANY**
SAGINAW, MICH.

BRANCH OFFICES:
Philadelphia New York Pittsburgh Atlanta Chicago St. Louis
Denver San Francisco

Full power with High or Lower Adjustment

Many emergencies requiring a
powerful jack present a diffi-
culty in bringing the jack to
bear on the load. The

Buckeye Emergency Jack No. 239 Special

saves time, strength and trouble.
The many positions to which it
is adjustable easily solve per-
plexing lifting problems. Full
details in our catalog. Write
for it.

**The Buckeye
Jack Mfg. Co.**
Alliance, Ohio



FOSTER SUPERHEATERS

Greatly Increase
Efficiency and Power of
Steam Turbines.
POWER SPECIALTY CO.
Trinity Building, 111 Broadway
NEW YORK



CONSERVES energy
and triples the steam-
ing capacity of your
boilers. Write for Cata-
log "C."

MURPHY IRON WORKS
Detroit, Mich. U.S.A.

WATER

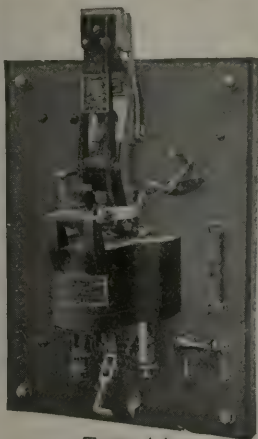
SOFTENING
OR
FILTRATION

FOR BOILER FEED AND ALL INDUSTRIAL USES

WM. B. SCAIFE & SONS CO.

PITTSBURGH, PA.

Self Operating D. C. Sub-Stations



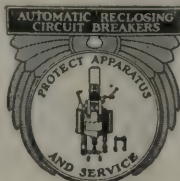
Type AA

If Uncle Sam should draft all the sub-station operators off their jobs it would certainly put a lot of railway power plants down and out. But *not those*

Equipped With
**AUTOMATIC
RECLOSING
CIRCUIT BREAKERS**

These remarkable protective devices open in case of overload or short circuit, and reclose automatically upon removal of same. They can also be arranged to automatically shut down the machine in case of hot bearings, Hot Transformers, A. C. Voltage Failure, Reverse Current overspeed, etc.

**The Automatic
Reclosing
Circuit Breaker Co.**
Columbus, Ohio



"Efficiency, the Need of the Hour. How to Ob- tain It in the Paint Shop"

Write for this free booklet. It furnishes general information regarding the Sherwin-Williams Modern Method Car Painting System. It will acquaint those interested in efficient car painting with the advantages to be derived through its use.

Modern Method Car Painting System eliminates all unnecessary labor and the use of excess materials, bringing about the best results in service, with a minimum expense for labor and material.

THE SHERWIN-WILLIAMS CO.

Paint and Varnish Makers
601 Canal Road, N. W.
Cleveland, Ohio



Repair Shop Machinery and Cranes

Built by

NILES-BEMENT-POND CO.

111 Broadway, New York

Boston Philadelphia Pittsburgh Chicago
St. Louis Birmingham, Ala. London

WE CAN CUT YOUR COST OF HEATING CURRENT

Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.

VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.

ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.

ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, $3\frac{1}{2}$ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK & MFG. CO.

142 Oxford Street, Philadelphia

INSULATING TAPE



DIXON'S Graphite Brushes

are of uniform texture, free from abrasives and cannot possibly cut a commutator.

Booklet 108-M will interest you.

Made in JERSEY CITY, N. J., by the

JOSEPH DIXON CRUCIBLE COMPANY

Established 1827



"Everything in Insulation"

Mica
Vulcanized Fibre
Varnished Cloth
Insulating Tapes

Waxes
Asphalts
Compounds
Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.

MITCHELL-RAND M'FG CO.
103 John St., New York City

Hale and Kilburn No. 108

for One-Man Safety Cars
and for heavy city service

Only four parts—Steel Aisle
End Support, Steel Wall End
Support, hardwood framed
Rattan Cushion, framed Rat-
tan Back. Note new yoke-
less pedestal.

The
No. 108
is only
One-half
the Weight
of Seats
with Iron
Castings.



Hale and Kilburn Company

Philadelphia New York Chicago Washington
Atlanta San Francisco Detroit Louisville

The famous men of the
electric railway field
contribute the benefit
of their experience to the

ELECTRIC RAILWAY JOURNAL

Have You Read This?

It sets forth the fun-
damentals of energy
saving through
metering the energy
used. A valuable
treatise mailed on
request.



ECONOMY ELECTRIC DEVICES CO.

EXCLUSIVE SALES AGENT
Sangamo Economy Railway Meter
5 OLD COLONY BLDG. CHICAGO

The Kalamazoo Trolley Wheels

have always been made of entirely
new metal, which accounts for their
long life WITHOUT INJURY TO
THE WIRE. Do not be misled by
statements of large mileage, because
a wheel that will run too long will
damage the wire. If our catalogue
does not show the style you need,
write us—the LARGEST EXCLU-
SIVE TROLLEY WHEEL
MAKERS IN THE WORLD.



THE STAR BRASS WORKS

KALAMAZOO, MICH., U. S. A.

HEATING AND VENTILATING YOUR CARS is
the problem to-day. Let us show you how to do both
with one equipment. Now is the time to consider
this change before you start your cars through the
shops for overhauling. Kill two birds with one stone.

THE PETER SMITH HEATER COMPANY

1759 Mt. Elliott Ave., Detroit, Mich.

The Best Shade Rollers for Cars

SPECIAL shade rollers for cars, that will last and give satisfac-
tion for years, and yet cost but little more than the poorest
you can buy, are made by the Stewart Hartshorn Co., E. Newark,
N. J. This company is by far the largest shade roller manufacturer
in the world. It is able to give high quality at lower prices because
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you buy shade rollers
if they bear the signature

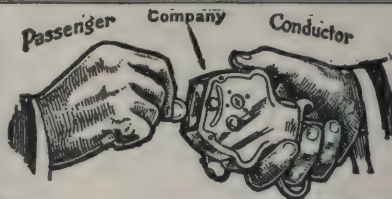
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Use them in your terminals—
**PEREY TURNSTILES
or PASSIMETERS**

Faster than the ticket seller

Perey Manufacturing Co., Inc.
30 Church Street, New York City



Direct
Automatic
Registration
By the
Passenger

Rooke Automatic
Register Co.
Providence, R. I.

The Big Three

**D & W Fuses, Deltabeston Wire
D & W Oil Fuse Cutouts**

D & W Fuse Co., Providence, R. I.

JACKS

Barrett Track and Car Jacks
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Duff Ball Bearing Screw Jacks
Duff Motor Armature Lifts

The Duff Manufacturing Co., Pittsburgh, Pa.

International Specialties Cover the Entire Range of Fare Collection

Money-counting fare boxes; Coin and metal ticket-counting fare boxes; Coin registers; Coin and transfer registers; Coin, metal ticket and transfer registers; Motor-driven coin and transfer registers; Motor-driven registers for station, ferry, park and terminal use; Metal and paper registers with single hopper; Round and square registers; Transfer printers; Heeren Enamelled Badges; Punches and Bell Cord.

The International Register Company
15 South Throop Street, Chicago



Dependable Operation

Dependable operation hinges on the correctness of the methods used to maintain it.

The use of
**Nuttall Sleet Wheels
and Scrapers**

is the most reliable method of keeping your wires clear of ice and snow.

NUTTALL
PITTSBURGH

Snow Scrapers for All Types of Cars That Make Good Absolutely

Prompt Delivery

ROOT SPRING SCRAPER CO., Kalamazoo, Mich.

"Boyerized" Products Reduce Maintenance

Bemis Trucks	Manganese Brake Heads
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Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

Consolidated High Grade Products

Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

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Manufacturers of The Providence Fender and H-B Life Guard
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

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Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost.

The Cooper Heater Company
Carlisle, Pa.

The Standard for Speed, Accuracy, Durability

B-V Visible Punch

Look for this



BONNEY-VEHSLAGE TOOL COMPANY
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Bonham Traffic Recorders

Show origin and destination of every fare collected as well as other valuable traffic data.

The Bonham Recorder Co., Hamilton, O.

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cars and station steps.

Universal Safety Tread Company
Waltham, Mass.

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You get more than simply BRAKE SHOES when you use our Product.

You get the advantage of our constant effort to improve our product for your service.

You get the earnest co-operation of our engineers to assist you in getting the full quota of service from each Brake Shoe applied.

Miles of service from the Brake Shoe are more to be desired than pounds of scrap.

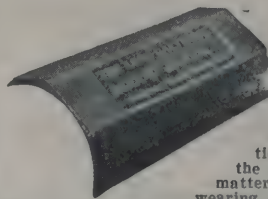
All of which means increased efficiency and decreased cost of Brake Maintenance.

American Brake Shoe & Foundry Co.

30 Church St., New York

M McCormick Bldg., Chicago

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Universally Serviceable

Ajax Car Brasses possess exceptional toughness and sufficient plasticity to conform to irregularities in the journal and the intrusion of foreign matter. They are slow-heating, and non-wearing on the journal.

They are used on some of the largest trunk lines of the country and on many smaller systems—both standard and narrow gauge—on logging cars, mine cars, contractor's cars, etc. They give maximum service wherever used, with the least worry and lowest cost of upkeep. Catalog "Ajax Bearings, Castings and Babbitt Metal for Railway Equipment" gives all particulars. Copy on request.

THE AJAX METAL COMPANY

Main Office and Works
Philadelphia, Pa.

Established 1880
Offices in Principal Cities

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General Offices—111 WEST MONROE ST., CHICAGO

City and Interurban Cars and Trucks,
Snow Sweepers and Plows,
Express, Combination and Work Cars,
Electric Locomotives



AMERICAN CARBON AND GRAPHITE MOTOR AND GENERATOR BRUSHES are selected according to operating conditions. We know brush material—you know your machine. Our combined knowledge will solve your brush problems.

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OF NATIONAL CARBON CO., INC.

UNION SPRING & MFG. CO. SPRINGS

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M. C. B. Pressed Steel Journal Box Lids

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RAILWAY UTILITY COMPANY

Sole Manufacturers

"HONEYCOMB" AND "ROUND JET" VENTILATORS for Monitor and Arch Roof Cars, and all classes of buildings; also ELECTRIC THERMOMETER CONTROL of Car Temperatures.

141-151 WEST 22D ST. Write for 1328 BROADWAY
Chicago, Ill. Catalogue New York, N. Y.



MASON SAFETY TREADS—prevent slipping and thus obviate damage suits.

KARBOLITH CAR FLOORING—for steel cars is sanitary, fireproof and light in weight.

STANWOOD STEPS—are non-slipping and self-cleaning.

Above products are used on all leading railways. For details address

AMERICAN MASON SAFETY TREAD CO.

Main Offices: Branch Offices: Boston New York City, Chicago, Lowell, Mass. Philadelphia, Kansas City, Cleveland, St. Louis.

HORNE RAILWAY DEVICES

Horne Double Acting Brakes
Giant Geared Brakes
Differential Staffless Brakes

Sterling Safety Brakes
Sterling Trolley Bases
Sterling Sand Boxes
Lord Screenless Air Cleaners for Compressors

Q-P Trolley Catchers
Hydrogrounds and Lightning Arresters

Fenders and Wheelguards
Controller Fingers
Friction and Rubber Tape
Packing and Gaskets
Air Hoses and Rubber Specialties

HORNE MANUFACTURING CO., 50 Court St., Brooklyn, N. Y.

SEARCHLIGHT SECTION

IMMEDIATE SHIPMENT

TURBINES

- 1—500 KW. Westinghouse horizontal turbo unit, 3 ph., 60 cy., 360 v., 3600 rpm.
- 1—500 KW. General Electric Curtis steam turbine, 3 ph., 60 cy., 1800 rpm., 2300 volts, 150 lb. steam pressure, vertical type.
- 1—500 KW. Westinghouse Horizontal Turbo Generating Unit wound for 3 phase, 60 cy., 2300 volts, speed 3600 rpm., condensing duty.

DIRECT CONNECTED ALTERNATING UNIT

- 1—800 KW. Allis-Chalmers, 2300 v., 3 ph., 60 cy., 90 rpm. generator, direct connected to 22 and 44 x 48" Reynolds Corliss engine.

60 CYCLE ROTARY CONVERTERS

- 1—300 KW. West. rotary converter, 3 ph., 60 cy., 370 v., A.C., 575 v., D.C., 600 rpm., with 3—185 KVA. Gen. Elec., 60 cy. transformers, 2200-370 volts.
- 1—200 KW. Westg. 3 ph., 60 cy., 720 rpm., Rotary Converter, 575 volts D.C., 360/370 volts A.C.
- 1—150 KW. West. 3 ph., 60 cy. rotary converter, 550 v., 720 rpm., with two Scott connected transformers.

ARCHER & BALDWIN, Inc.

114-118 Liberty Street, New York City Telephone 4337-4338 Rector



Railway Motors

Ten Westinghouse No. 306 Railway Motors, Type CA.

Eight Westinghouse No. 317-A-2 Railway Motors with gears and pinions, ratio 21:68, 6-in. axle bearings, complete with double-end ALF control.

Four Westinghouse No. 317-A with gears and pinions, ratio 21:68, 6-in. axle bearings.

Rotary Converters

Three 300-kw. General Electric Type TC Rotary Converters, 3 phase, 60 cycle, 6 pole, 600/1200 volts d.c., 379 volts a.c., 1200 r.p.m.

Three 300-kw. General Electric 3-phase Transformers, oil cooled, 12,000/24,000 volts primary, 370 volts secondary, with four 2½ per cent reduced-capacity taps in primary and 50 per cent starting tap in secondary.

Complete switchboard equipment.

We have on hand all classes of Power Machinery

MACGOVERN & COMPANY, Inc.

114 Liberty Street, New York City

Some One Wants to Buy

the equipment or machinery that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it Before depreciation Scraps it.

*The Searchlight Section is helping others
—let it help you also.*

Receiver's Sale of Electric Railroad Supplies

LEGAL NOTICE

Notice is hereby given that the undersigned, Charles D. Davidson, as Receiver of the property of the Gary and Interurban Railroad Company and of the East Chicago Street Railway Company, pursuant to authority given to him by order of the District Court of the United States for the District of Indiana in the cause entitled "Central Trust Company of Illinois et al vs. Gary and Interurban Railroad Company et al, No. 134 In Equity," will at his office at 800 Broadway, Gary, Indiana, on the

25th day of February, 1918

at ten o'clock, A.M., and from day to day thereafter until sold, offer for sale at private sale for cash a stock of electric railroad supplies consisting of repair parts for the following: GE-205-B motors, Westinghouse 112-B motors, No. 15 Cooper heater, McQuire-Cummings high speed trucks, Westinghouse L-4 control, and other items.

Dated this 23rd day of January, 1918.

CHARLES D. DAVIDSON,
as Receiver of the Gary and Interurban Railroad Company and of the East Chicago Street Railway Company.

85 lb. A. S. C. E. Relayers

16,000 tons—with Angle Bars to match. Available immediate shipment and centrally located.

We positively own these Rails and offer same in carload lots and over. 25,000 tons—Relayers—sizes 25 lb. to 100 lb., in stock our Pittsburgh yards and vicinity.

Immediate shipment guaranteed and prices very attractive.

Carload and less than carload inquiries and orders solicited.

Rails cut to length for structural purposes.

Frogs, Switches, Bolts, Nuts, Spikes and all Accessories.

L. B. FOSTER COMPANY
Park Bldg. Pittsburgh, Pa.

CLEVELAND ARMATURE WORKS

Cleveland, Ohio

Everything in the Line of Repairs to Electrical Machinery

Complete Armatures, New Armatures, Rewound Armature Cores, Armature Shafts, Armature Coils, Fields and Commutators.

Established 22 Years.

RAILS Locomotives, Cars, Machinery, Piling, Tanks

We've got too much to list here, so we've issued

BULLETIN 230

68 pages **ZELNICKER** in ST. LOUIS Get it now!

WANTED TO LEASE

Fully equipped up-to-date

Electric Railway Park

Griffiths & Crane

Builders and Operators of Amusement Parks.

(Many years' experience)
Electric Railway references

P. O. Box 465
Philadelphia

NEW ADVERTISEMENTS for the

SEARCHLIGHT SECTION

can be received until 10 A.M. Wednesday for Saturday's issue.



**OPEN and CLOSED
MOTOR and TRAIL**

Write for Price and Full Particulars to

ELECTRIC EQUIPMENT Co.
601 Commonwealth Bldg. Phila. Pa.

SEARCHLIGHT SECTION

FOR SALE

57,000 lbs. 500,000 circular
Mills Triple Braid Weather-
proof Cable; brand new.
For further particulars,
apply to

W. R. Kerschner Co., Inc.

50 Church Street
New York

The subscription was discontinued because a "Want" Advertisement brought results

Editor—"We are sorry to lose your sub-
scription, Mr. Jackson. What's the mat-
ter? Don't you like our politics?"

Mistah Jackson—" 'Tain't dat, sah;
'tain't dat. Mah wife jes' been an' dun
landed a job o' wuk for me by advertisin'
in youh darned ole papah."

If you're looking for a "job o' wuk" in the elec-
tric railway field—

—if you're looking for a competent man who will
be able to handle a big or a little "job o' wuk" and
who will bring RESULTS—

—there is no more efficient or economical method
of securing either than the insertion of a card in
the

SEARCHLIGHT SECTION

Copy for "Want" and "For Sale" cards can be
received on Wednesday for issue out on Saturday.

ELECTRIC RAILWAY JOURNAL

10th Ave., at 36th St., New York

WANTED

General Electric Co.
SYNCHRONOUS CONVERTER
#130,724

Type H.C.—12—500—600, Form
P., Amperes 909, Volts 550.

STARTING REACTANCE

Type OT—67—75/
/60—410

Cycles 60, K.V.A. 75.
416 Amperes per phase, 60 volts
per phase.

For 430 Volt circuit.

TRANSFORMERS—Single Phase

Type O.C.—Form B-1.
60 cycles—185 K.W.
Volts 10,000/410.

Newport News & Hampton Ry.,
Gas & Electric Co.
Hampton, Va.

Direct Current Belted Generator

1—500 KW., 550 V., 320 RPM., Cp.
Wd. Westinghouse 3 bearing direct
current generator.

DUQUESNE
New and Used Electrical Equipment Co.
Electric & Mfg Co.

Bessemer Bldg., Pittsburgh

FOR SALE AT 50% DISCOUNT

Railroad Track Scale

Fairbanks No. 4318—38-ft. plat-
form and 50 tons capacity, in ex-
cellent condition, only used a short
time. Also a lot of new set screws,
tap screws, square iron, round iron,
hexagon round and square bronze,
brass tubing, antimony, core nails,
flat rivets and tool steel.

Write for list.

**Pascagoula Street Railway &
Power Co.**

Pascagoula, Miss.

*There is a
Searchlight Section
in each of
the following papers:*

- [1] American Machinist
- [2] Coal Age
- [3] Electrical World
- [4] Electrical Merchandising
- [5] Electric Railway Journal
- [6] Engineering and Mining Journal
- [7] Engineering News-Record
- [8] Metallurgical and Chemical Engineering
- [9] Power

Each of these 9 papers
is the leading periodical of
the industry it serves.

Searchlight advertise-
ments will get you in touch
with the important men of
these important industries.

Transformers

22000 Volts

FOR IMMEDIATE DELIVERY

3—200 KVA—Never been used

General Electric Type H Single Phase,
60 Cycle, 22000 to 23000 Volts, with two
5% reducing taps on high tension
winding. Outdoor Type.

**General Engineering &
Management Corp.**

141 Broadway, New York

SEARCHLIGHT SECTION

Get your Wants into the Searchlight

ADVERTISING RATES

Under "Positions Wanted," including Salesmen looking for new connections, Evening Work Wanted, etc., undisplayed advertisements cost **three cents a word**, minimum charge 50 cents an insertion, payable in advance; less 10% if one payment is made in advance for 4 continuous insertions.

Under "Positions Vacant," including Agents and Agencies Wanted, Representatives Wanted, Salesmen Wanted, Partners Wanted, Business Opportunities, Employment Agencies, and Miscellaneous For Sale, For Rent, and Want

ads; also Auction Notices, Receivers' Sales, Machinery and Plants For Sale or Wanted, undisplayed advertisements set solid in one paragraph, cost **five cents a word**, minimum charge \$1.50 an insertion.

Machinery advertisements (undisplayed) set with a paragraph for each item, or tabulated, 30 cents a line, minimum 5 lines.

If replies are in care of any of our offices, allow five words for the address.

All advertisements for bids (Proposals) cost \$2.40 an inch.

ADVERTISEMENTS IN DISPLAY TYPE

cost as follows for single insertions:

1/4 p. (1 1/2 x 3 3/4 ins.).....	\$5.00	1 in. (1 x 2 1/2 ins.).....	\$3.00
1/2 p. (2 1/2 x 3 3/4 ins.).....	10.00	4 inches (4 x 2 1/2 ins.)..	11.60
3/4 p. (3 1/2 x 3 3/4 or 2 3/4 x 7 ins.).....	20.00	8 inches (8 x 2 1/2 ins.)..	22.40
1 p. (10 1/4 x 3 3/4 or 5 x 7 ins.).....	40.00	15 inches.....	40.50

For space to be used within one year, to be divided to suit requirements of advertiser, provided some space is used at least once a month following first insertion:

1 page.....	\$80 a page	18 pages.....	\$56 a page
3 pages.....	72 a page	26 pages.....	52 a page
6 pages.....	64 a page	32 pages.....	50 a page
9 pages.....	62 a page	40 pages.....	48 a page
12 pages.....	58 a page	52 pages.....	45 a page

In replying to advertisements, do NOT enclose original testimonials, or anything that you may want returned. State your qualifications in as concise and neat a manner as you can and enclose COPIES of testimonials. In machinery ads, use a local name or address if possible so that readers can wire direct and get quick replies.

POSITIONS VACANT

ACCOUNTANT and office manager wanted by public service corporation. Must be familiar with uniform system of accounts prescribed by the Public Service Commission, First District. State experience and salary expected. P-61, Elec. Ry. Journal.

CHIEF engineer wanted, for 1500 K. W. railway plant in a city of 125,000; must be familiar with sub-station operation and motor generator sets. Give age, experience and salary expected, reference copies only. P-58, Elec. Ry. Journal, Philadelphia.

COMPETENT Signal Man wanted for Automatic A. C. Track Circuit Signals and Trolley Contracts. Ft. Dodge, Des Moines & So. R. R. Co., Boone, Iowa.

FIRST-CLASS armature winder wanted; also one first-class electrical repair man. Steady employment with good pay for right parties. P-56, Elec. Ry. Journal, Chicago.

FIRST class general all-round shop man wanted for small Southern road. One who can do all kinds of general car work and necessary carpenter, painting, blacksmith, and machine work and armature winding. Tell us all about yourself in first letter and advise as to the minimum salary you will start on. Excellent opportunities for advancement. P-47, Elec. Ry. Journal, Chicago.

GENERAL foreman or assistant master mechanic wanted, capable of handling men, by a street railway company in New England, experienced in surface car inspections and repairs. Good salary. Permanent position to right man. P-53, Elec. Ry. Journal.

I WANT a man who can handle men and incidentally be an electrical or mechanical engineer, a live wire, exempt from draft, to take charge of underground lines, electrolysis and rail-bonding, with an electric railway in Central West. An excellent future for the man of ability who desires to be permanently located and who is willing to work hard and await opportunity for advancement. Applicants state age, references, experience, salary. P-55, Elec. Ry. Journal, Chicago.

MASTER mechanic wanted for a large city and interurban property; one of the best opportunities in the country for a first-class, competent and energetic man. Write fully, giving all particulars as to education and experience. P-27, Electric Railway Journal, Cleveland.

POSITIONS VACANT

MASTER mechanic wanted for small road. State your qualifications and salary wanted in first letter. This is a desirable and permanent position for the right man. Delightful and healthy climate and position offers good chances for regular increases in salary in direct proportion to results you obtain. P-48, Elec. Ry. Journal, Chicago.

MOTORMEN wanted for one-man cars, 22 cents per hour to start on. Exceptionally good chances for advancement to more responsible positions. P-49, Elec. Ry. Journal, Chicago.

SAFETY expert, experienced in street railway traffic operation wanted by a large city and interurban property. Attractive position for good man. P-37, Elec. Ry. Journal, Cleveland.

STOREKEEPER, experienced in electric railway materials, capable of taking charge of stock of approximately \$25,000 or acting as receiving clerk for general foreman at a general storehouse. Give age, detailed experience for the last five years, salary expected, and reference in first letter. P-41, Elec. Ry. Journal, Philadelphia.

SUPERINTENDENT transportation wanted for city and interurban operation in Central West. System of two hundred miles. Applications desired only from men thoroughly familiar with every detail. P-39, Elec. Ry. Journal, Chicago.

WANTED, by large interurban line, Central West, accountant, with thorough understanding of electric railroad accounting. P-57, Elec. Ry. Journal, Chicago.

DRAFTSMEN WANTED

Experience in either structural work, car construction, or application of electric and brake equipment to cars. Location, Middle West. Give full particulars and salary expected. P-59, Electric Railway Journal, Leader-News Bldg., Cleveland, Ohio.

In Replying to "Blind" Ads

be careful to put on envelope the key number in the ad, and also local address of office to which reply is sent.
10th Ave. at 36th St., New York.
1570 Old Colony Bldg., Chicago.
657 Leader-News Bldg., Cleveland.
935 Real Estate Trust Bldg., Phila.
501 Rialto Bldg., San Francisco.

Important

Original letters of recommendation or other papers of value should not be enclosed to unknown correspondents—send copies.

POSITIONS WANTED

AUDITOR, employed by small traction company, solicits change; 16 years' experience; age 39; married; references. PW-20, Electric Railway Journal, Cleveland.

CLAIM agent, adjuster, 33, twelve years' successful experience with large eastern company, desires change. PW-62, Elec. Ry. Journal.

ENGINEER, 30, successful experience as way and structure and electrical executive, familiar with modern economical operating methods, desires position as chief engineer or general superintendent of city or interurban of moderate size. Best references. PW-63, Elec. Ry. Journal.

EXECUTIVE, now employed, age 39, would consider a change, south preferred. Experience, constructing and operating of electric light and railway transmission, distribution, plants and substations. Ten years in present position giving entire satisfaction. Eighteen years with present employer on other properties. PW-46, Elec. Ry. Journal.

MASTER mechanic wants position on street or interurban lines. Good references as to ability and character. Fifteen years' experience. PW-50, Elec. Ry. Journal, Chicago.

POSITION wanted as master mechanic or general foreman; thoroughly experienced on city and interurban equipment, Type K, Sprague, Type M and H. L. control, straight and automatic air. PW-54, Elec. Ry. Journal, Chicago.

POSITION as superintendent or master mechanic of street railway system. Seventeen years' experience in construction and maintenance of cars and track. At present manager of small street railway company. Married; references. PW-64, Elec. Ry. Journal, Philadelphia.

TRAFFIC manager, general superintendent or superintendent transportation. Fifteen years' executive and operating experience. For ten years have specialized in traffic problems. Expert on schedules. Can handle men and show results through economical operation. Forty years old. Will furnish best of references as to energy, ability, character and sobriety. PW-51, Elec. Ry. Journal.

WANTED—To communicate with an electric railway company desiring services of superintendent of transportation, thoroughly familiar with every detail of transportation work. PW-60, Elec. Railway Journal.

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry
with Names of Manufacturers and Distributors

Advertising, Street Car.
Collier, Inc., Barron G.

Air Cleaners.
Horne Mfg. Co.

Air Rectifiers.
Holden & White, Inc.

Alloys, Steel & Iron.
(See also Bearings & Bearing Metals.)
Titanium Alloy Mfg. Co.

Anchor, Guy.
Electric Service Supplies Co.
Holden & White, Inc.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Anti-Climbers.
Railway Improvement Co.

Armature Shafts.
Laclede Steel Co.

Automobiles and Buses.
Brill Co., The J. G.

Axle Straighteners.
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Laclede Steel Co.
National Railway Appliance Co.
St. Louis Car Co.
Standard Steel Works Co.
Westinghouse Elec. & M. Co.

Babbitting Devices.
Columbia M. W. & M. I. Co.

Badges and Buttons.
Electric Service Supplies Co.
International Register Co., The

Batteries, Storage.
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Electric Service Supplies Co.
Ohio Brass Co.

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General Electric Co.
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Niles-Bement-Pond Co.

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Holden & White, Inc.

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Dixon Crucible Co., Jos.
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Bemis Car Truck Co.

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Carbon Brushes. (See Brushes, Carbon.)

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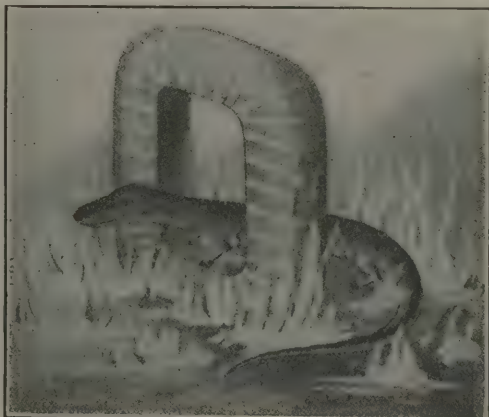
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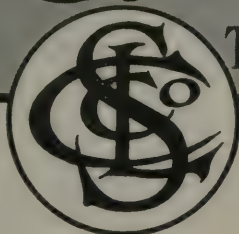
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Westinghouse Elec. & M. Co.

Replacers, Car.

Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Resistance, Grid.

Columbia M. W. & M. I. Co.
Ellicon Co.

Resistance, Wire and Tube.

General Electric Co.
Westinghouse Elec. & M. Co.

Retrievers, Trolley. (See Catchers and Retrievers, Trolley.)

Rheostats.

Ellicon Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Roofing, Building.

Barrett Co., The.

Sanders, Track.

Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Horne Mfg. Co.
Holden & White, Inc.
McGuire-Cummings Mfg. Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car.

Brill Co., The J. G.

Sash Metal, Car Window.

Hale & Kilburn Co.

Scales, Weights, Balances and Dynamometers.

Horne Mfg. Co.

Scrapers, Track. (See Cleaners and Scrapers, Track.)

Seats, Car.

Brill Co., The J. G.
Hale & Kilburn Co.
St. Louis Car Co.

Second-Hand Equipment (See also pages 53-55.)

Archer & Baldwin
Kerschner Co., Inc., W. R.
MacGovern & Co., Inc.

Shade Rollers.

Hartshorn Co., Stewart.

Shades, Vestibule.

Brill Co., The J. G.
Electric Service Supplies Co.

Shovels.

Hubbard & Co.

Shovels, Power.

Allis-Chalmers Mfg. Co.

Signal Systems, Block.

Electric Service Supplies Co.
Federal Signal Co.
Nachod Signal Co., Inc.
Wood Co., Chas. N.

Signals, Car Starting.

Consolidated Car Heating Co.
National Pneumatic Co.

Signal Systems, Highway Crossing.

Nachod Signal Co., Inc.

Slack Adjusters. (See Brake Adjusters.)

Sleet Wheels and Cutters.

Anderson Mfg. Co., A. & J. M.
Bonney-Vehslage Tool Co.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Holden & White, Inc.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

Snow-Plows, Sweepers and Brooms.

Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.

Soaps.

Sherwin-Williams Co.

Soldering and Brazing Apparatus. (See Welding Processes and Apparatus.)

Spikes.

American Steel & Wire Co.

Splicing Compounds.

Standard Woven Fabric Co.
Westinghouse Elec. & Mfg. Co.

Splicing Sleeves. (See Clamps and Connectors.)

Springs, Car & Truck.

American Steel Foundries.
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Sprinklers, Track & Road.

Brill Co., The J. G.
St. Louis Car Co.

Steps, Car.

American Mason S. T. Co.
Universal Safety Tread Co.

Stokers, Mechanical.

Babcock & Wilcox Co.
Green Engrg. Co.
Murphy Iron Works.
Westinghouse Elec. & M. Co.

Storage Batteries. (See Batteries, Storage.)

Straps, Car, Sanitary.

Holden & White, Inc.
Railway Improvement Co.

Structural Iron. (See Bridges.)

Superheaters.

Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow. (See Snow Plows, Sweepers & Brooms.)

Switch Stands.

Kilby Frog & Switch Co.
Ramapo Iron Works.

Switches, Track. (See Track, Special Work.)

Switches & Switchboards.

Allis-Chalmers Mfg. Co.
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Westinghouse Elec. & M. Co.

Tampers, Tie.

Ingersoll-Rand Co.

Tapes and Cloths. (See Insulating Cloths, Paper and Tape.)

Telephones and Parts.

Electric Service Supplies Co.

Testing Clips.

Frankel Connector Co.

Testing, Commercial & Electrical.

Elec'l Testing Laboratories.
Hunt & Co., Robert W.

Testing Instruments. (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats.

Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter.

Ticket Choppers & Destroyers.

Electric Service Supplies Co.

Ties, Mechanical.

Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel.

American Bridge Co.
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross. (See Poles, Ties, Posts, etc.)

Tools, Track & Miscellaneous.

American Steel & Wire Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Hubbard & Co.
Klein & Sons, Mathias.
Railway Track-work Co.

Torches, Acetylene. (See Cutting Apparatus.)

Towers & Transmission Structures.

American Bridge Co.
Archbold-Brady Co.
Bates Exp. Steel Truss Co.
Westinghouse Elec. & M. Co.

Tower Wagons and Auto-Trucks.

McCardell & Co., J. R.

Track, Special Work.

Barbour-Stockwell Co.
Cleveland Frog & Cross, Co.
Columbia M. W. & M. I. Co.
Indianapolis Switch & Frog Co.
Kilby Frog & Switch Co.
New York Switch & Crossing Co.
Ramapo Iron Works.

Transfers. (See Tickets.)

Transfer Tables.

American Bridge Co.
Archbold-Brady Co.

Transformers.

Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Treads, Safety, Stairs, Car Steps.

American Mason S. T. Co.
Universal Safety Tread Co.

Trolley Bases.

Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Holden & White, Inc.

Creosoting poles is Absolutely Necessary— *particularly* *under present conditions*

Because of the shortage of labor and high cost of material, the expense of maintaining telephone- and power-transmission lines has greatly increased. This has created marked interest in the use of *creosoted line-construction*, because of its economy and durability.

No one can accurately predict that the demand for raw materials and skilled labor will fully meet the supply during the next decade. Thus, it would be profit-insurance for

every company to protect its poles from decay by *creosoting them*. They would then obtain the maximum period of service at the minimum of annual cost.

Comparing the cost of setting poles ten years ago with the average of

the last three years, it is logical to assume that *it will cost more to replace a pole five or ten years hence than it does at present.*

The Brush Method of creosoting poles is available to every one. Its proper application will result in an annual saving upwards of 15 per cent.

The Open-Tank System is available at commercial pole-treating plants, or consumers of 2,000 poles (35' 0" or equivalent) or more per annum can equip themselves to treat by this process at a reasonable cost. This method will result in an annual saving of upwards of 25 per cent.

CARBOSOTA CREOSOTE OIL is the *standard* for the Brush Method and Open-Tank System.

(Green wood cannot be effectively creosoted by non-pressure processes. It should be air-dry. In regions of moist, warm climate, wood of some species may start to decay before it can be air-dried. Exception should be made in such cases, and treatment modified accordingly.)

Technical assistance, specifications, and any other information regarding the treatment of poles may be obtained gratis by addressing nearest office.

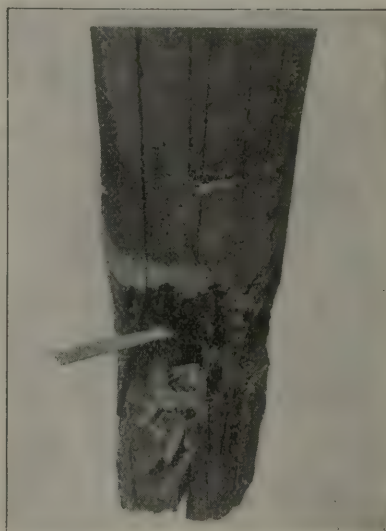
The **Barrett** Company

New York	Chicago	Philadelphia	Boston	St. Louis	Cleveland
Cincinnati	Pittsburgh	Detroit	Birmingham	Kansas City	
Minneapolis	Nashville	Salt Lake City	Seattle	Peoria	

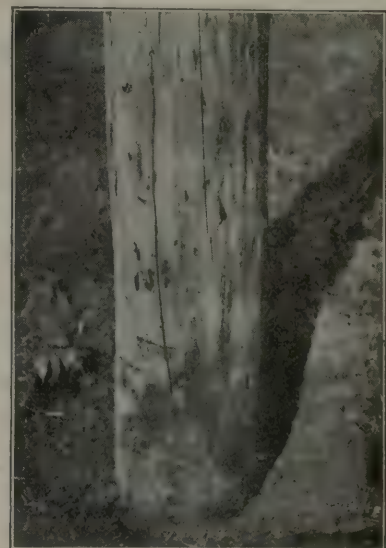
THE BARRETT COMPANY, Limited:	Montreal	Toronto	Winnipeg	Vancouver
	St. John, N. B.	Halifax, N. S.	Sydney, N. S.	



Condition of butt at and below ground-line of 45-ft. cedar pole after twelve years of service in Iowa



Forty-five foot cedar pole after twelve years of service entirely decayed below ground-line.



Creosoted pole eight years in service when photographed. Courtesy U. S. Forest Service.

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Specify Titanium-Treated Rails for **SAFETY**



Post-mortems are unpleasant things—both the post-mortem hearing on some wreck and the post-mortem analysis of the broken rail that caused it.

It's easy enough to see **after the accident** that the fracture was caused by some defect hidden from view in the original rail.

How much better to avoid such consequences from impurities in rail structure by specifying Titanium cleansing treatment.

For \$2 per ton, you can be insured both against unforeseen breakage of rails and uneconomical short life of rails.

TITANIUM ALLOY MANUFACTURING COMPANY

Operating Under Rossi Patents

Processes and Products Patented

General Office and Works:
Niagara Falls, N. Y.



Pittsburgh Office: Oliver Building
Chicago Office: Peoples Gas Building

New York Office: 165 Broadway

AGENTS:

Pacific Coast: ECCLES & SMITH CO., Los Angeles, San Francisco, Portland
Great Britain and Europe: T. ROWLANDS & CO., Sheffield, England

GURNEY



These Bearings don't get hot

When artificial cooling is not used, the temperature of a bearing is usually a fair indication of the power wasted in friction.

The greater the power waste the hotter the bearing gets, and the hot bearing is usually considered more important than the power waste which causes it.

Gurney Ball Bearings eliminate both the danger and trouble of hot bearings and the power waste of friction. Their use lowers power costs, eliminates expensive shut-downs, and reduces the cost of lubrication.

The reliability of Gurney Bearings has been proven in machine tools, electric motors, in main journals of electric railway cars and in thousands of automobiles and trucks.

Gurney Ball Bearing Company

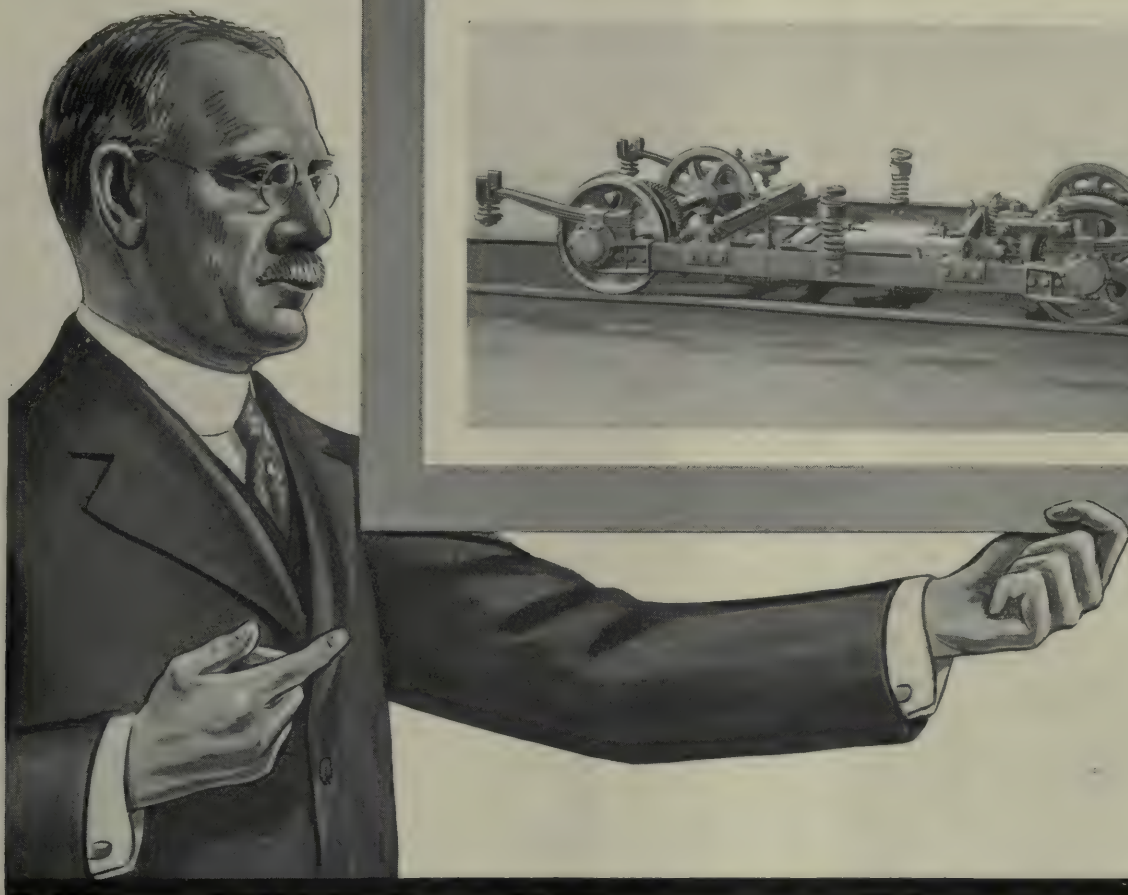
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Jamestown, N. Y.

New York City

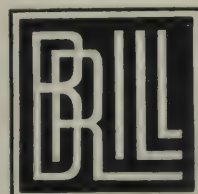
Ball Bearings



Mr. Birney says :

“While I was in Tampa recently riding over the lines on one of their new ‘Safety Cars’ with the mayor, a number of councilmen and railway officials, I was impressed more than ever with the remarkable riding qualities of the Brill 78-M Truck, which was expressly designed for ‘Safety Cars.’ I believe it is the best single-truck that has ever been built. The railway and city officials said that the car rode as smoothly and steadily as any double-truck car they ever had on the lines.”

THE J. G. BRILL COMPANY, PHILADELPHIA, PA.
AMERICAN CAR COMPANY, ST. LOUIS, MO.
G. C. KUHLMAN CAR CO., CLEVELAND, OHIO.
WASON MANFG. CO., SPRINGFIELD, MASS.
CIE. J. G. BRILL, 49 Rue des Mathurins, PARIS



This 10,000-kw. Curtis Turbine Generator is in the service of the Kansas City Railways Company, Kansas City, Missouri.

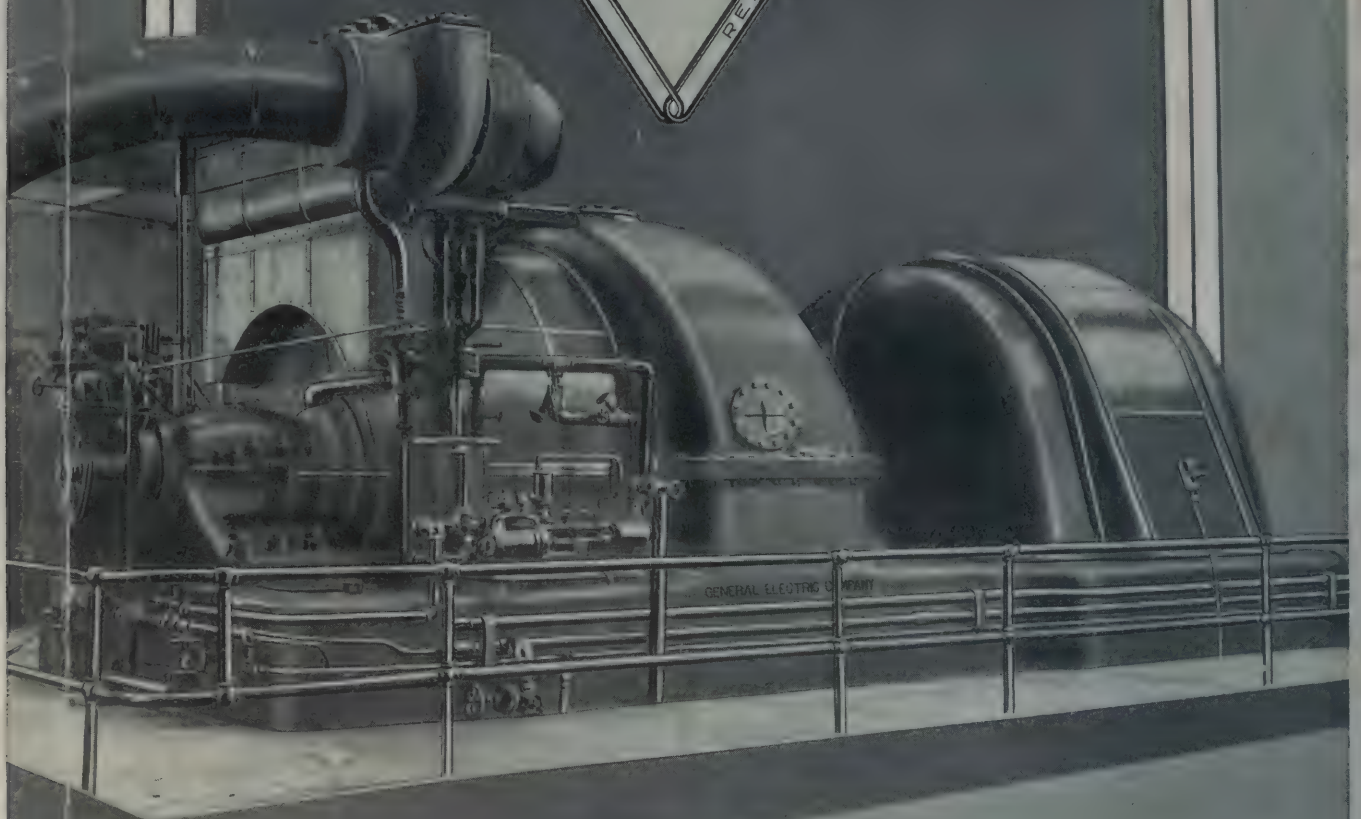
Curtis Steam Turbines are manufactured in sizes ranging from 1 to 50,000 kw.

CURTIS TURBINES

LINKED
TOGETHER

ECONOMY

RELIABILITY



General Electric Company

General Office: Schenectady, N. Y.

Sales offices in all large cities



